

FIGURE 1A

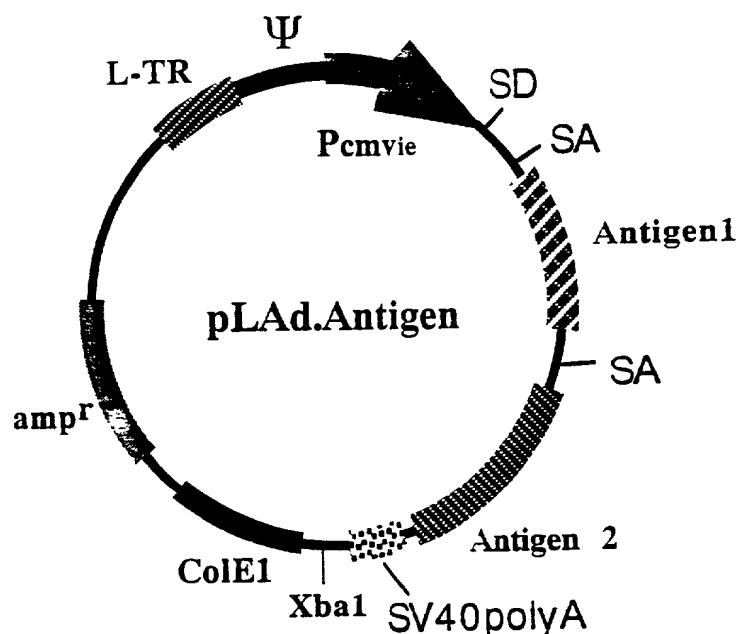


FIGURE 1B

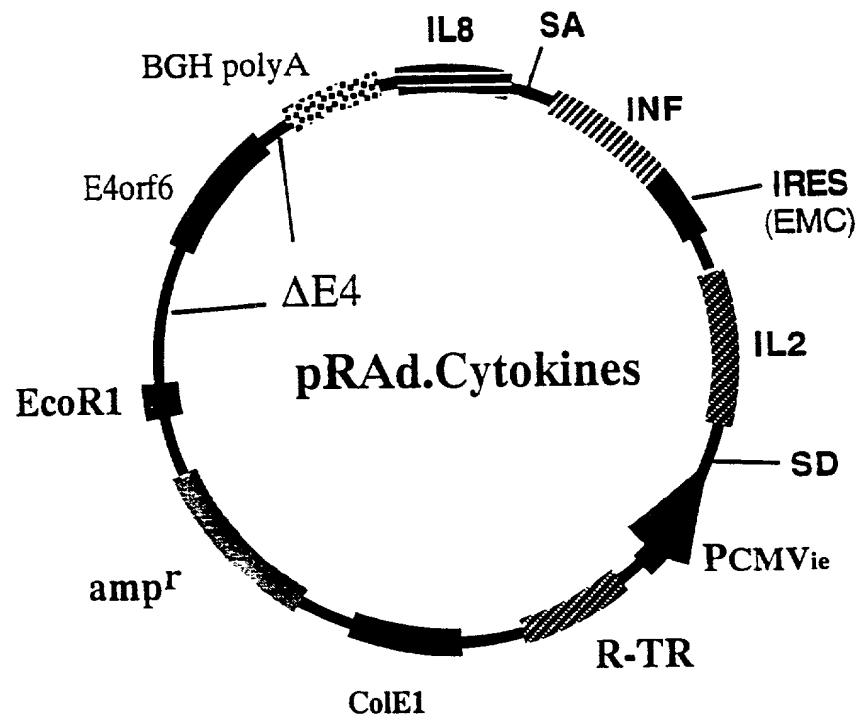


FIGURE 1C

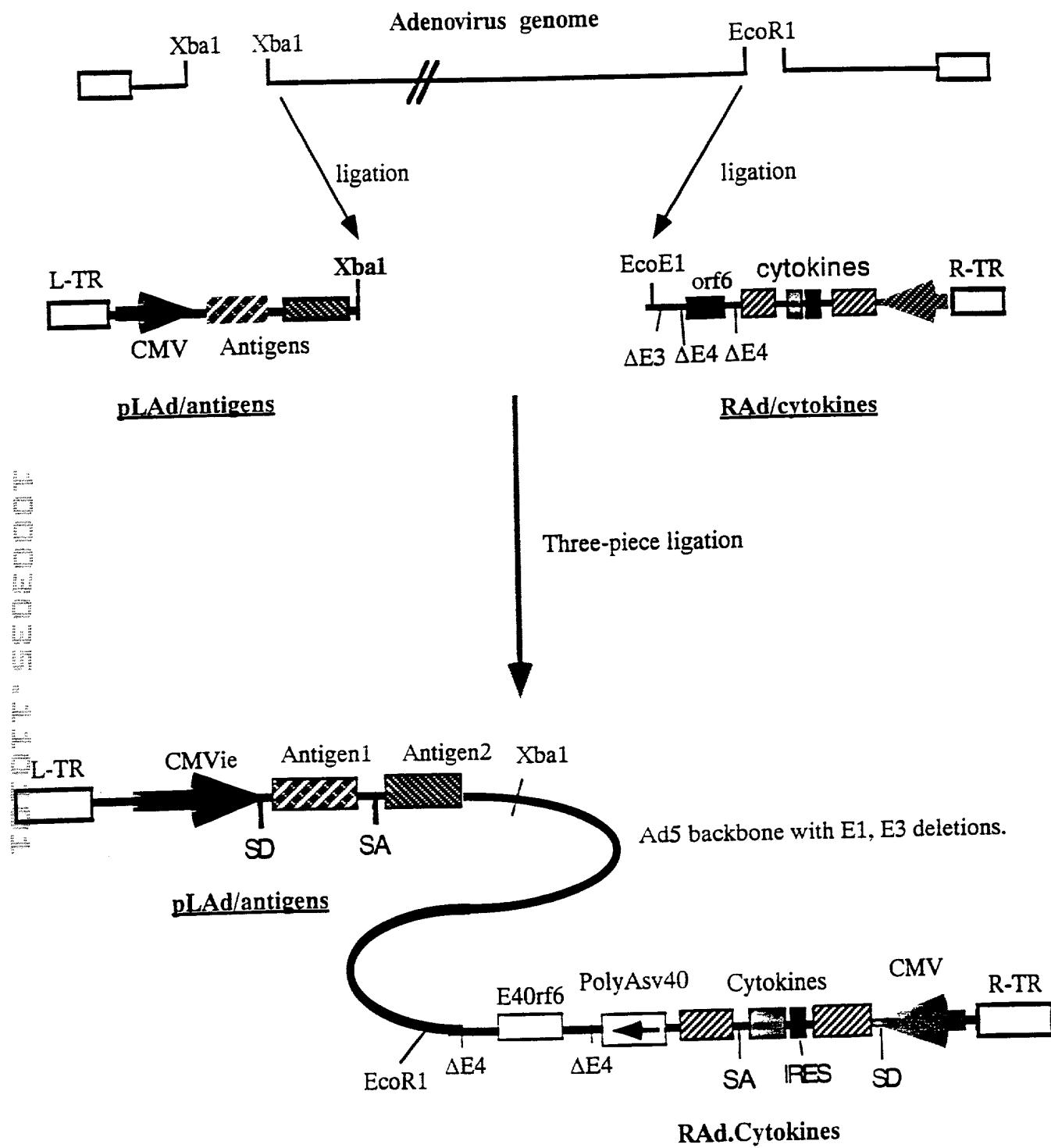
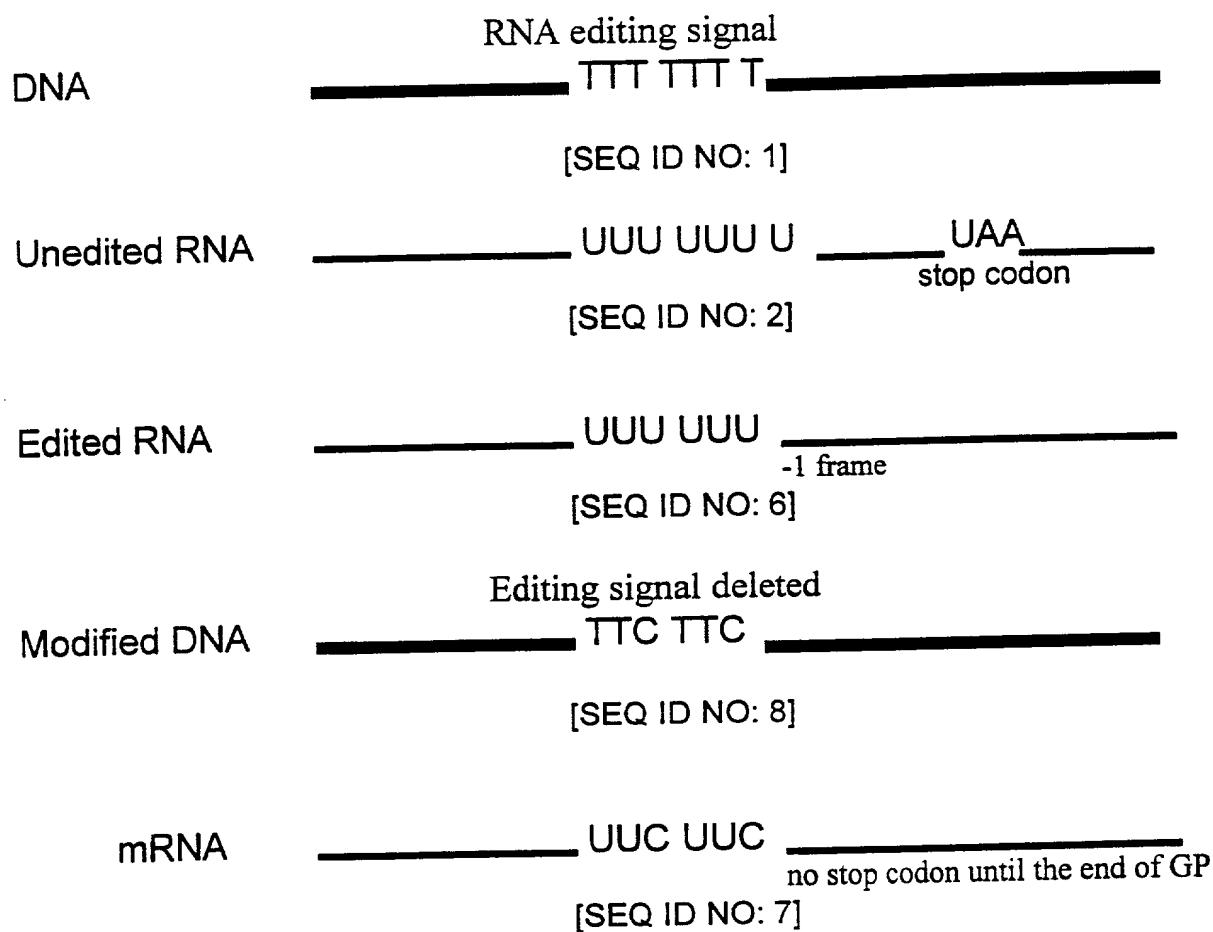


FIGURE 2



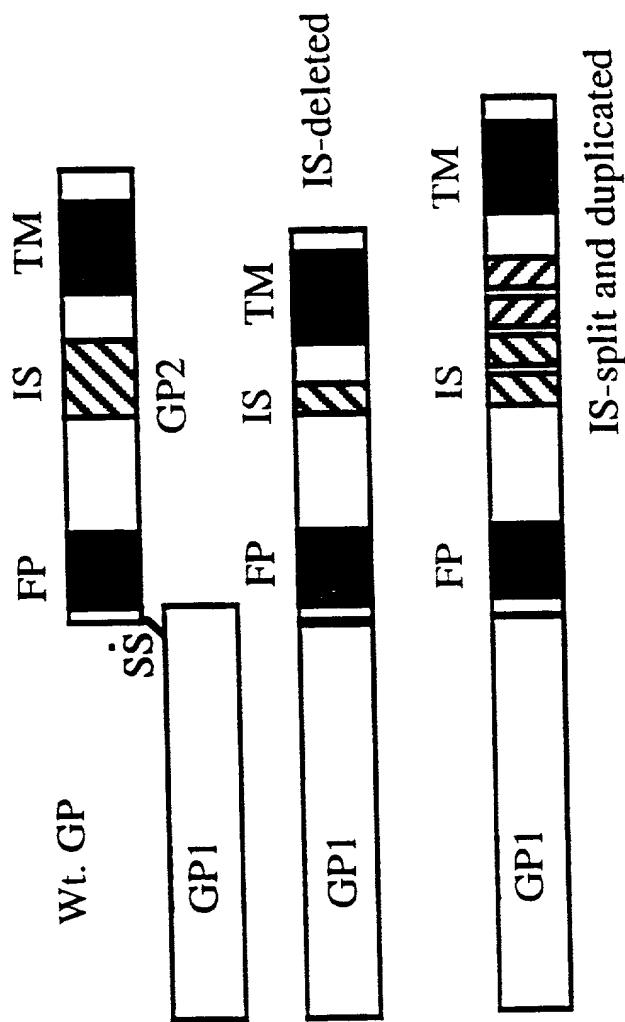


FIGURE 3A

FIGURE 3B

FIGURE 3C

FIGURE 4A

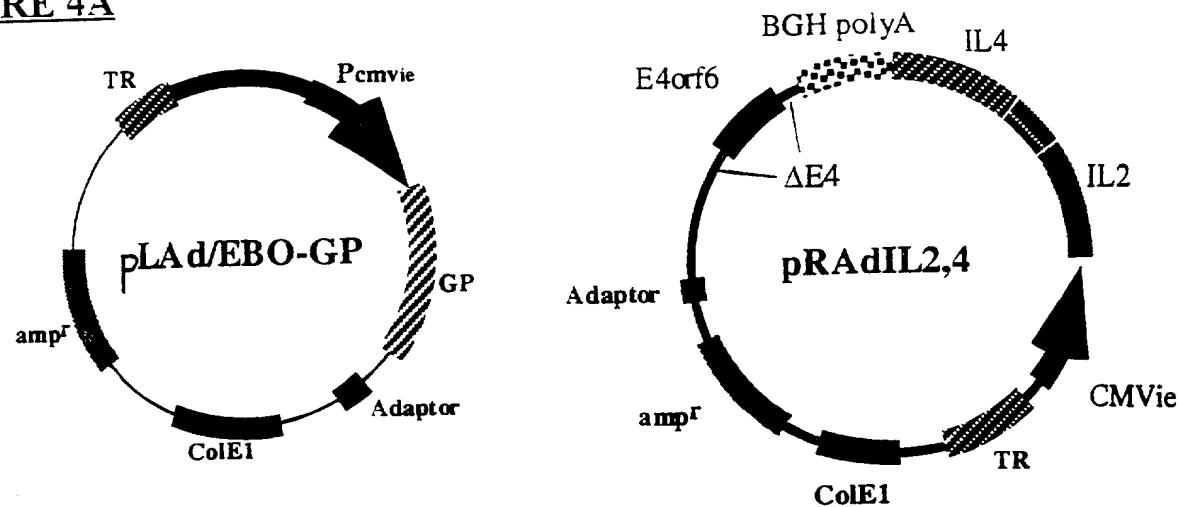


FIGURE 4B

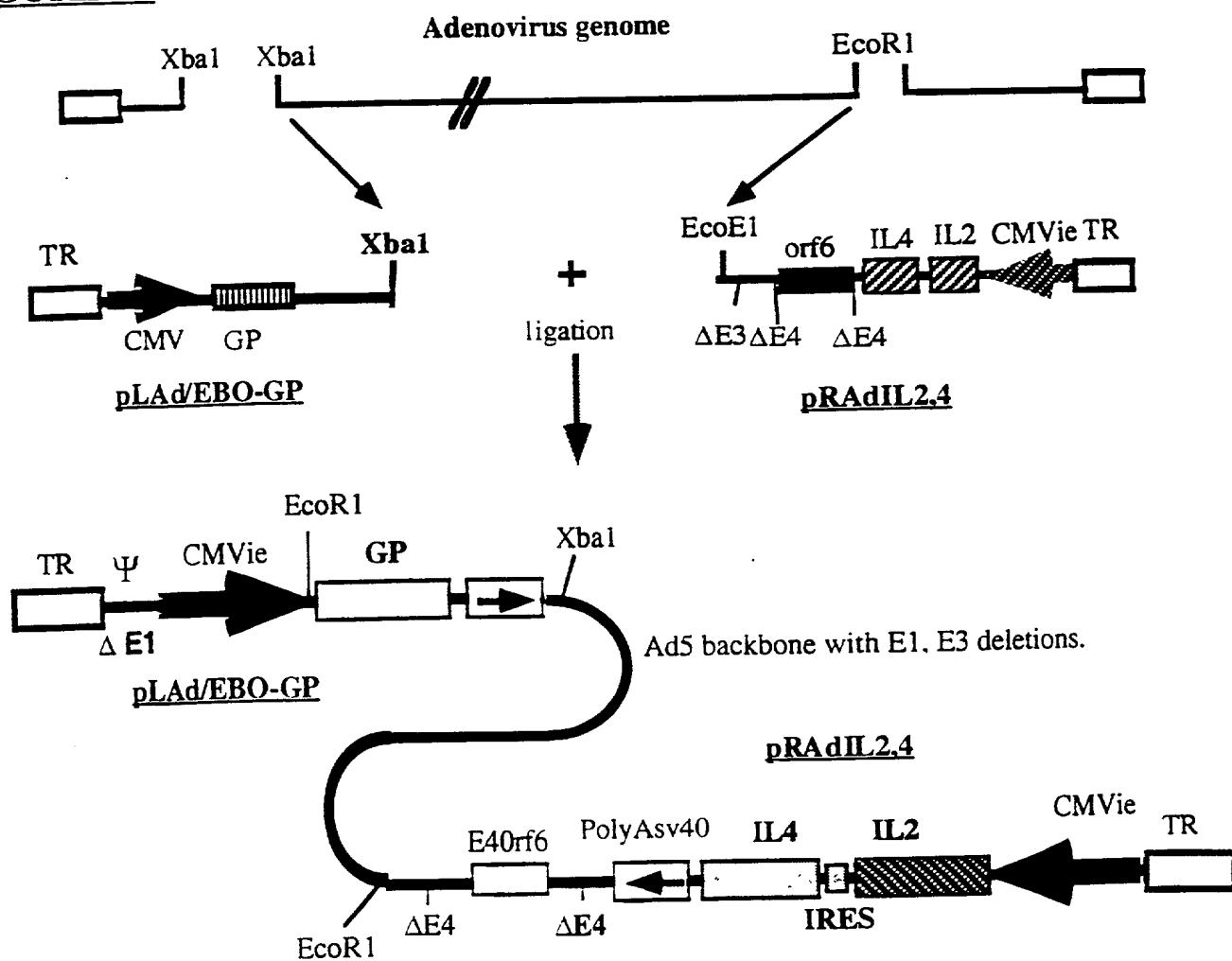
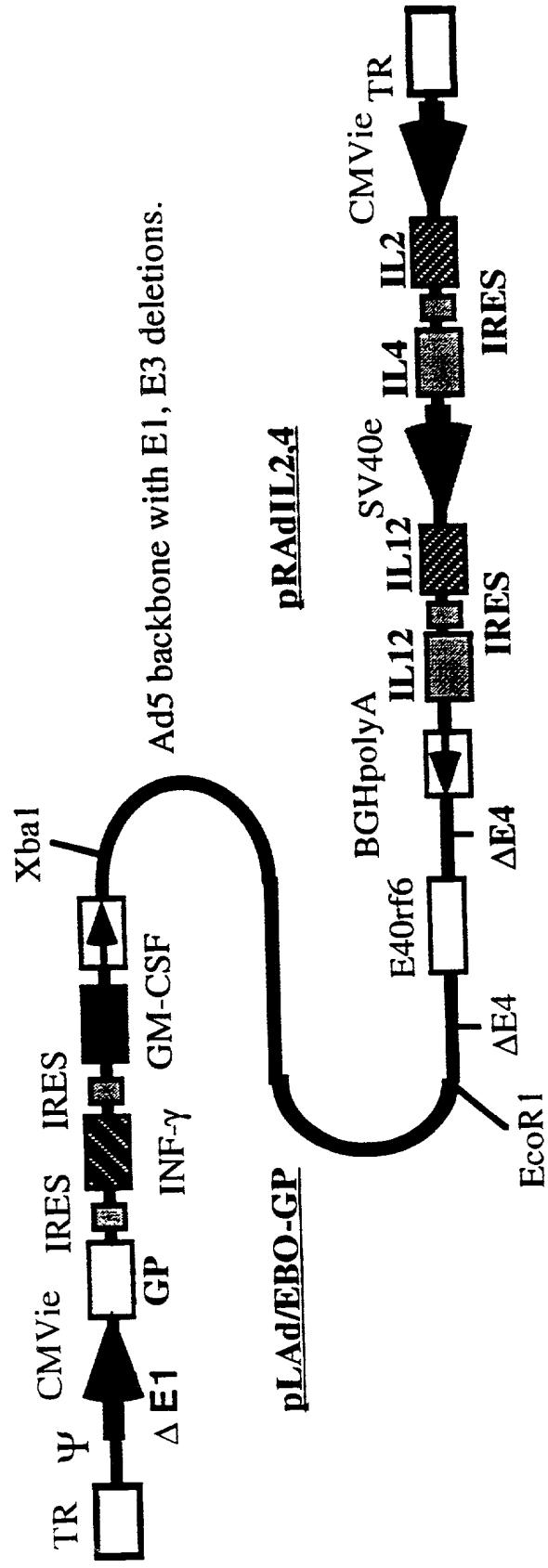


FIGURE 5



Anti-HIV (tat,env) relative titer
(Group 3)

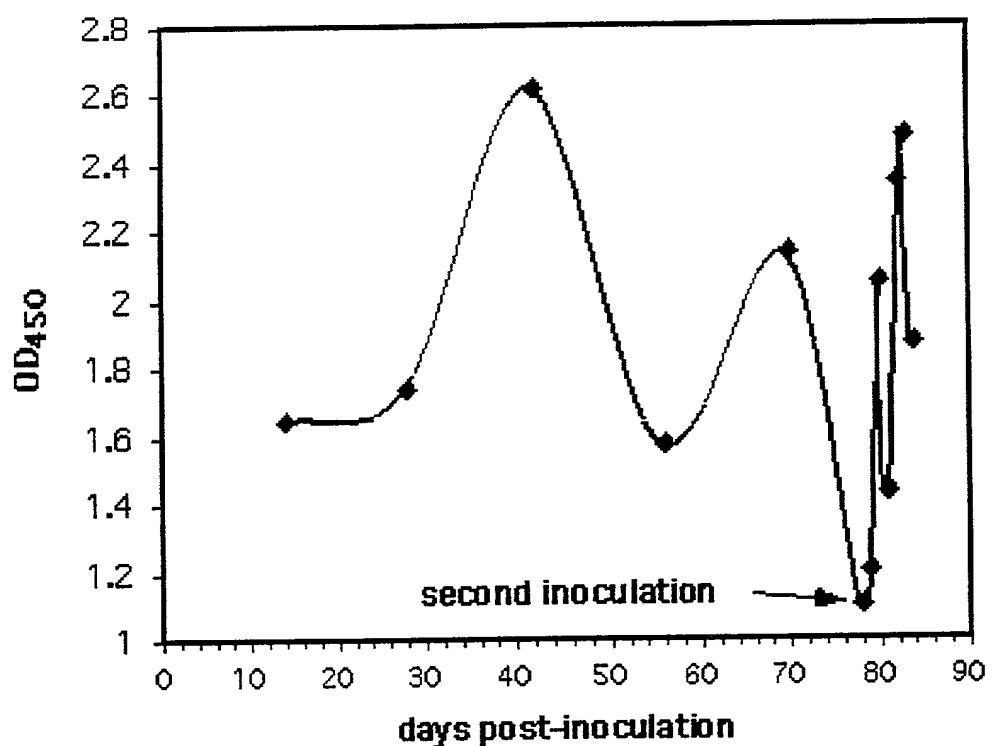


FIGURE 6

Anti-HIV (tat,env) relative titer
(Group 4)

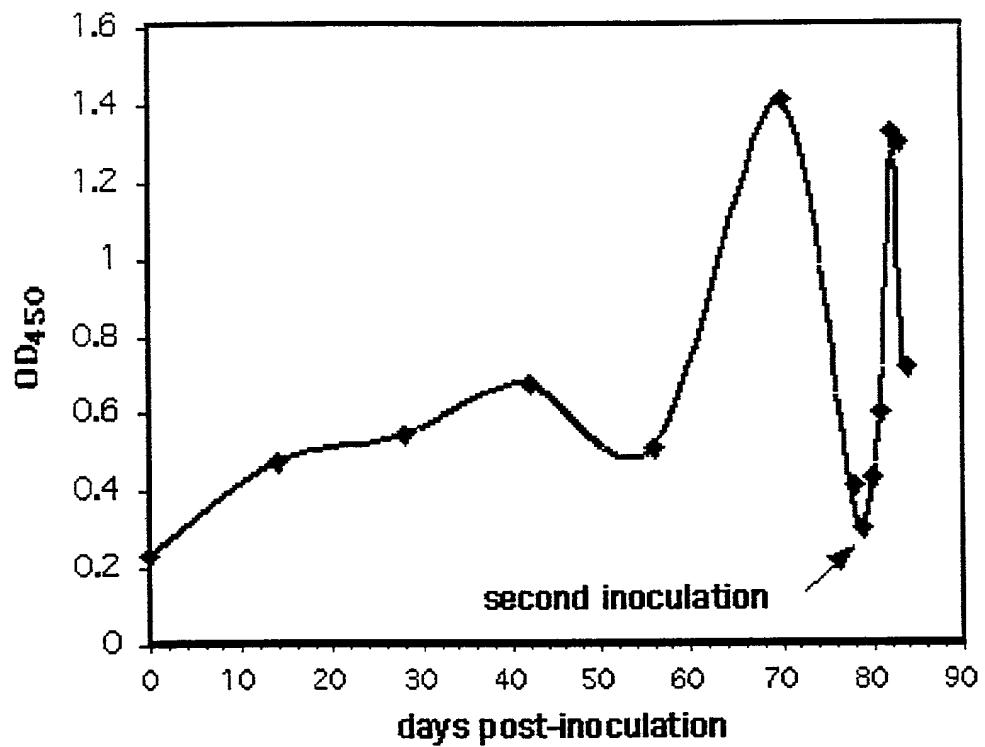


FIGURE 7

IFN γ secretion from activated splenocytes in response to target cell stimulation

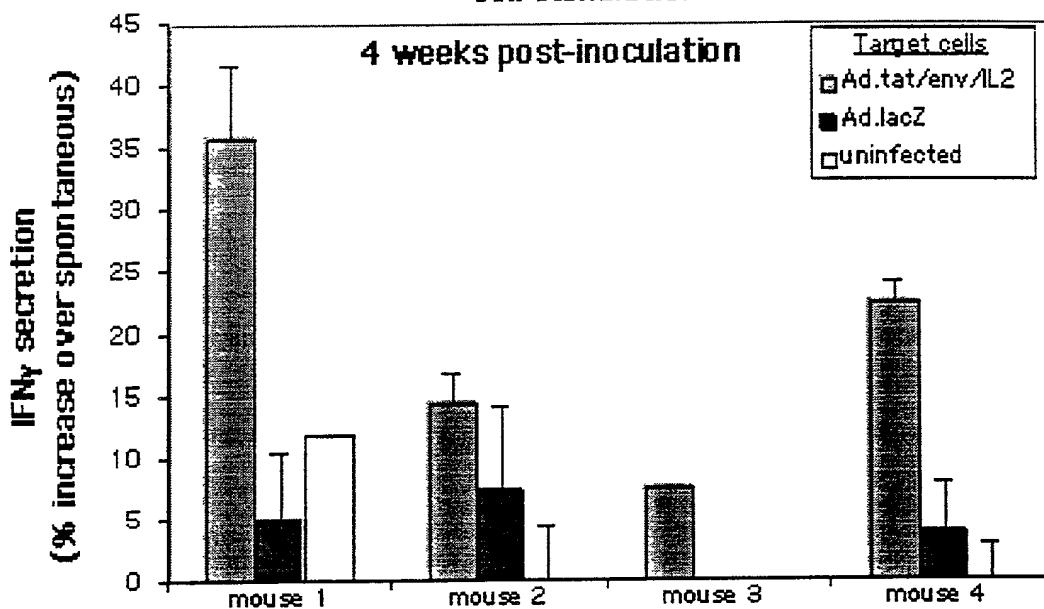


FIGURE 8A

IFN γ secretion from activated splenocytes in response to target cell stimulation

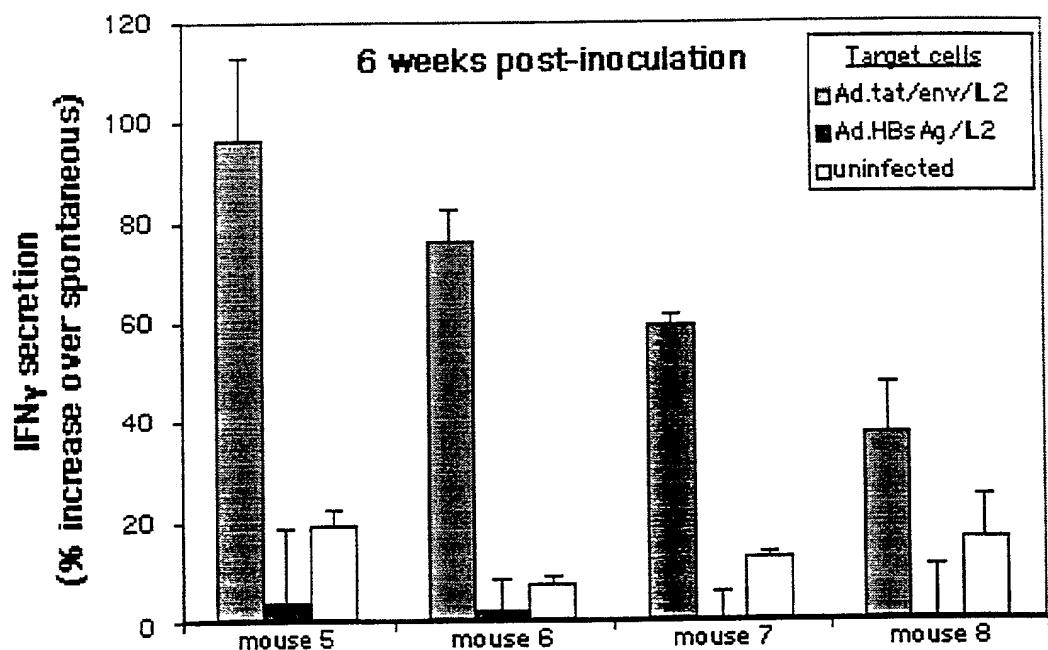


FIGURE 8B

IFN γ secretion from activated splenocytes in response to target cell stimulation

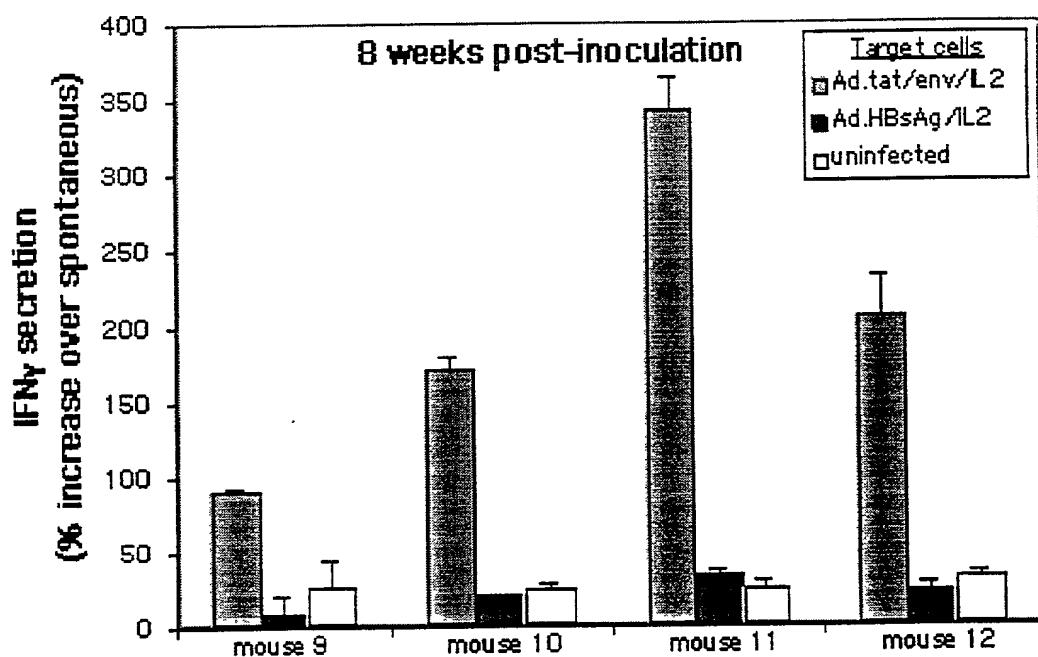


FIGURE 8C

Granzyme A secretion from activated splenocytes in response to stimulation with target cells

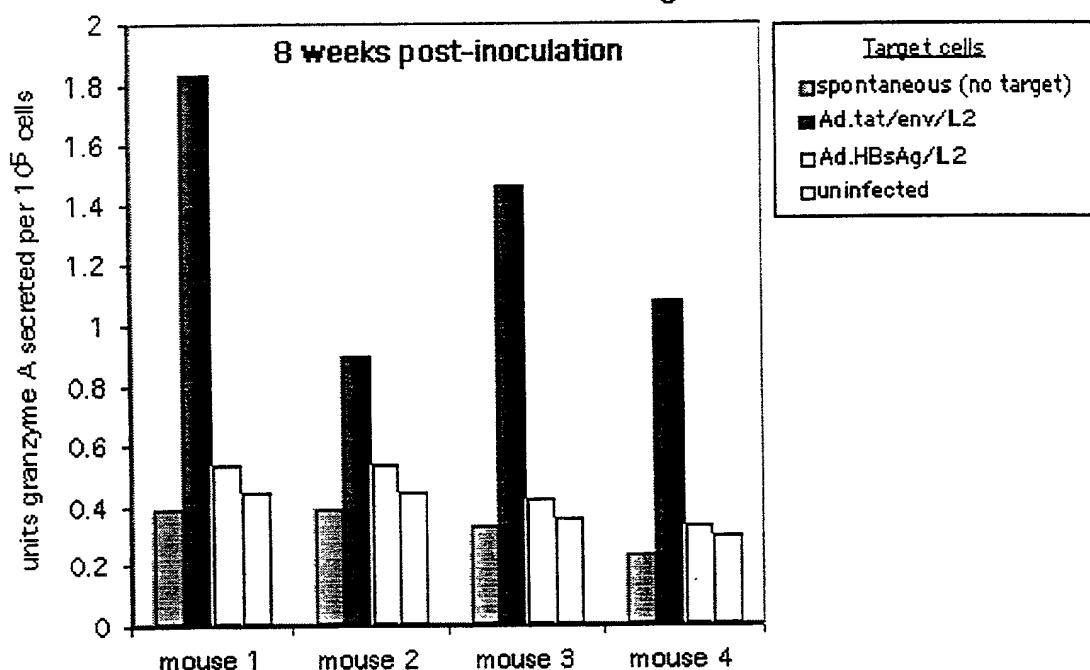


FIGURE 9

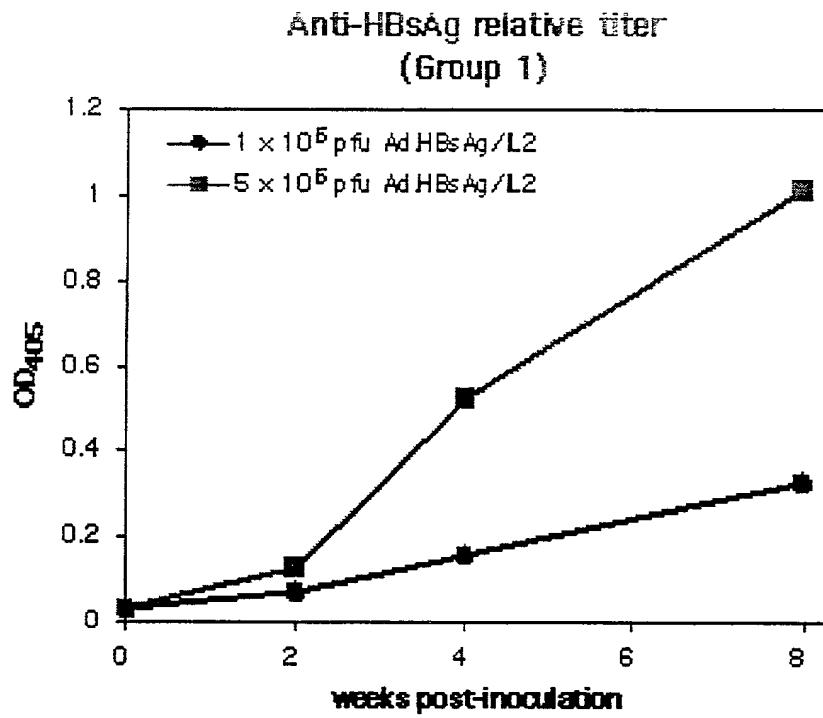


FIGURE 10A

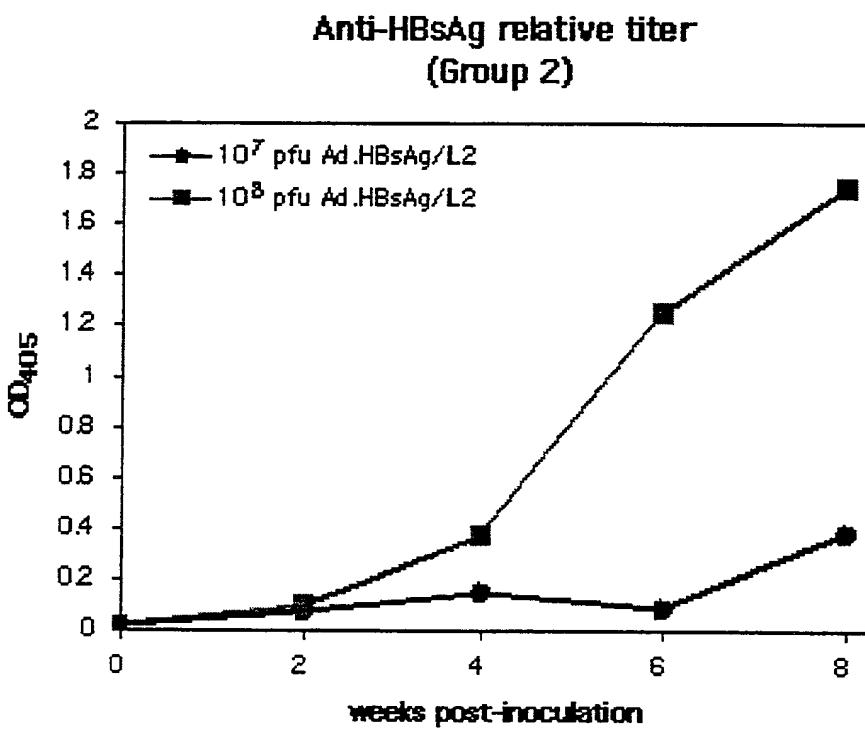


FIGURE 10B

Anti-HBcAg relative titer
(Group 3)

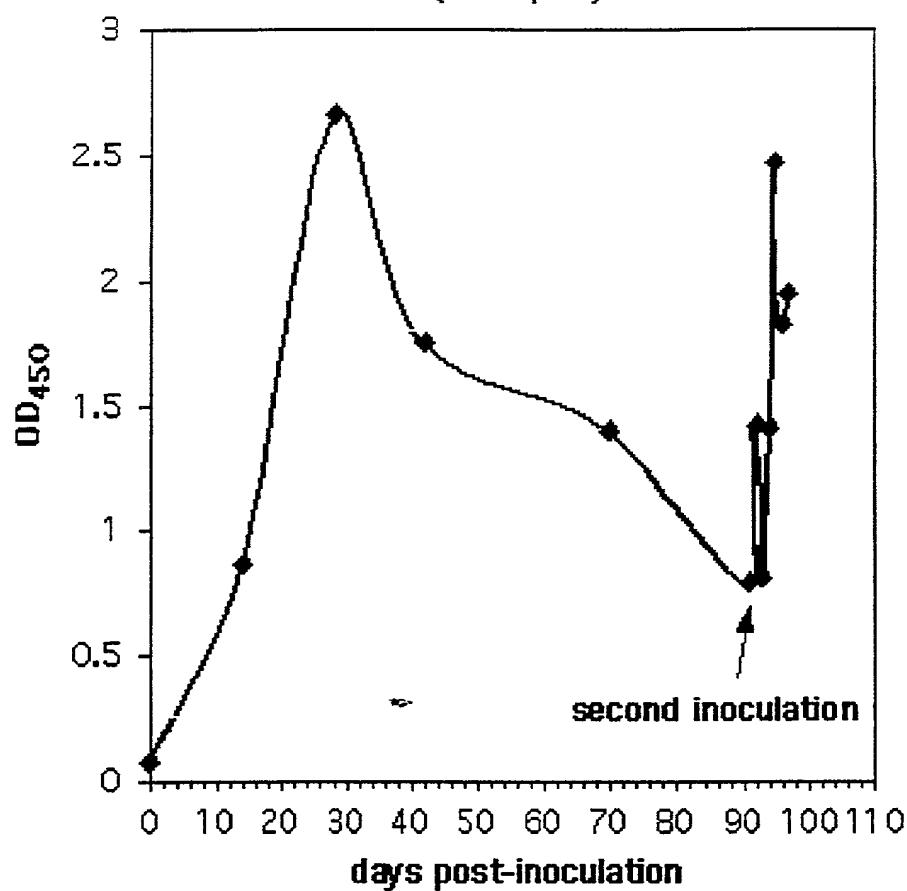


FIGURE 11A

Anti-HBcAg relative titer
(Group 4)

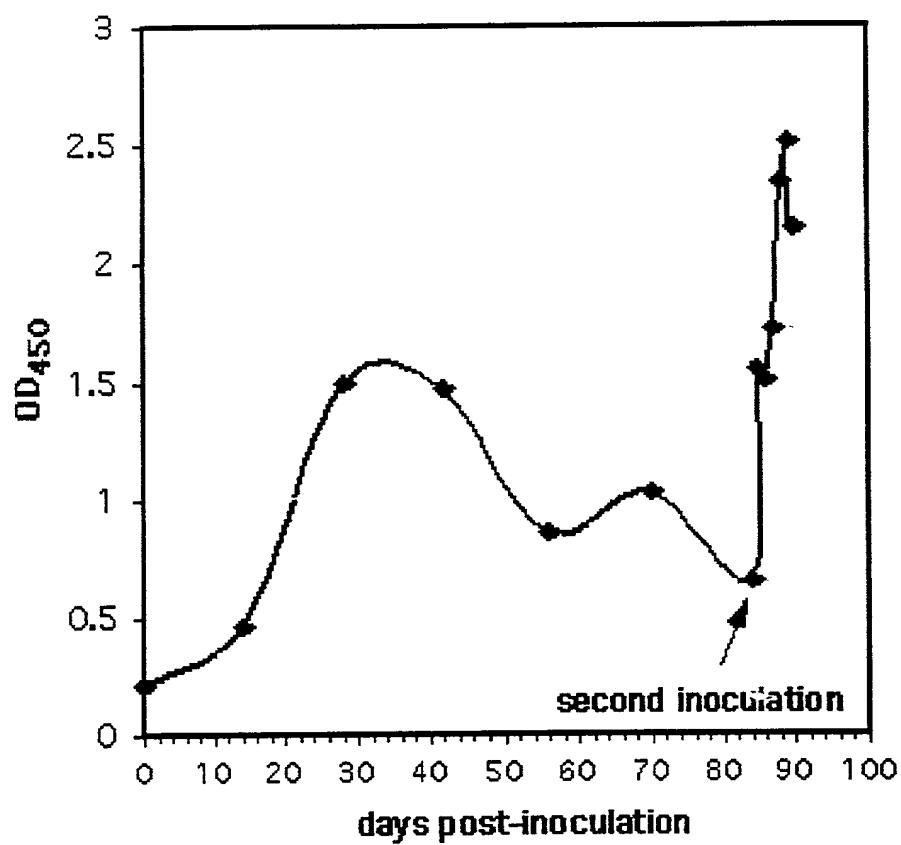


FIGURE 11B

FIGURE 12

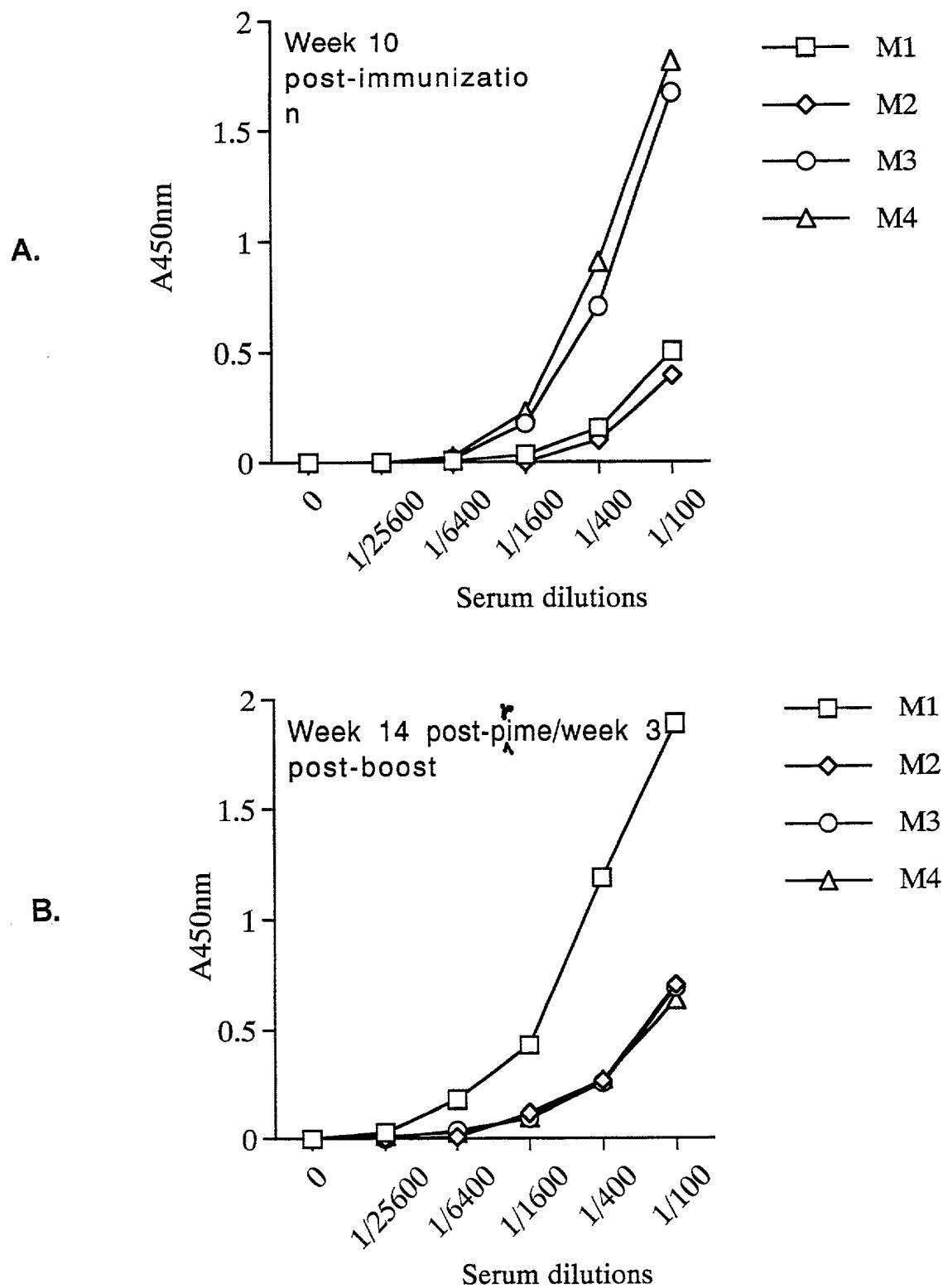


FIGURE 13

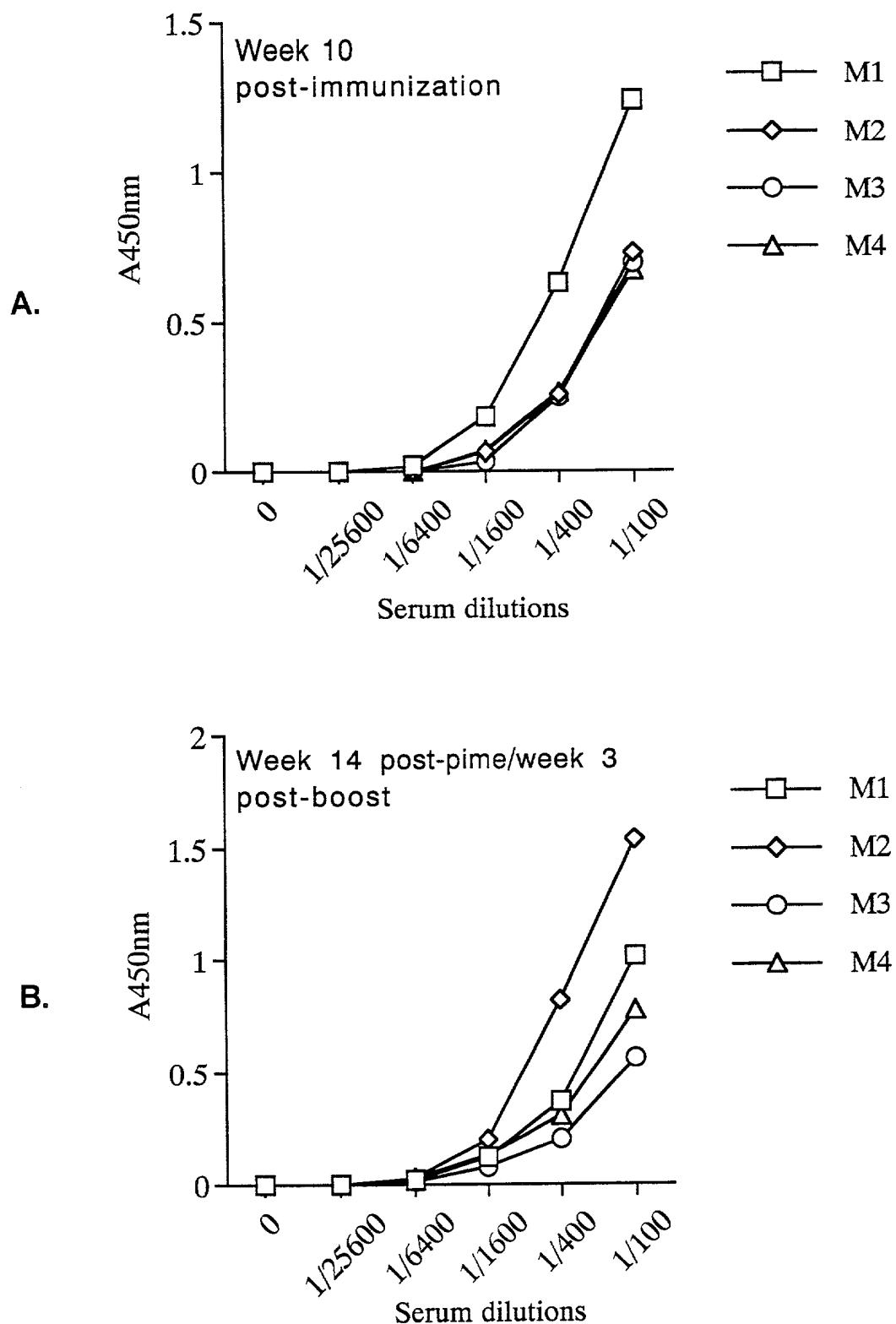


FIGURE 14

Gag-specific IFN γ secreting splenic cells
after immunization of mice with Ad(3C,
Gag, Env)

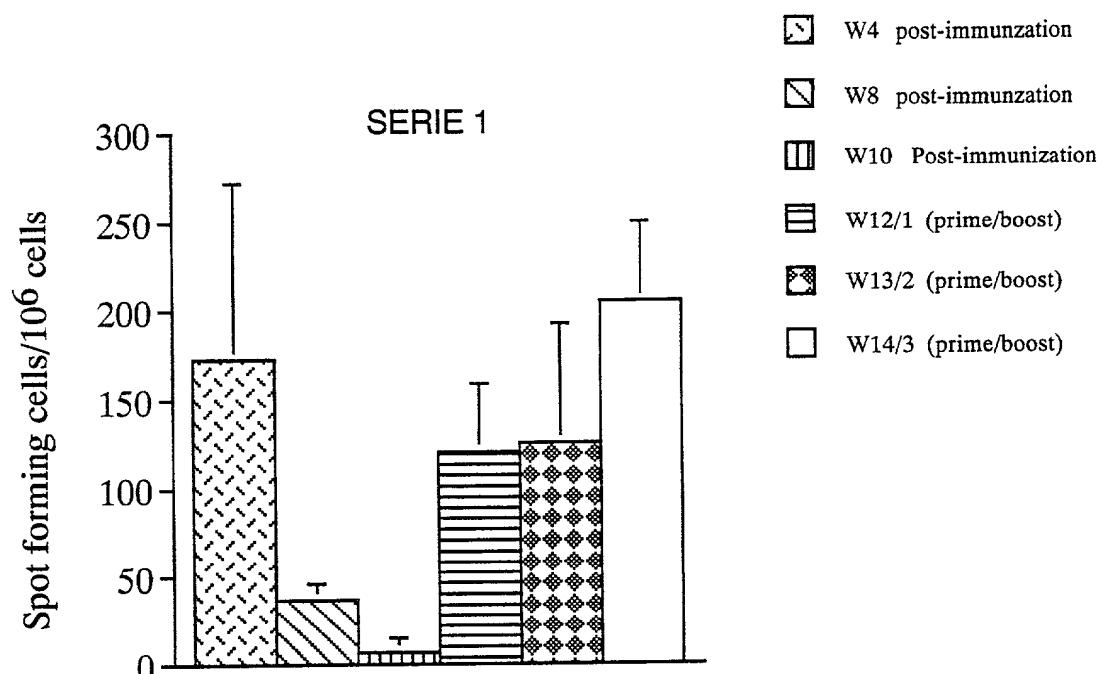
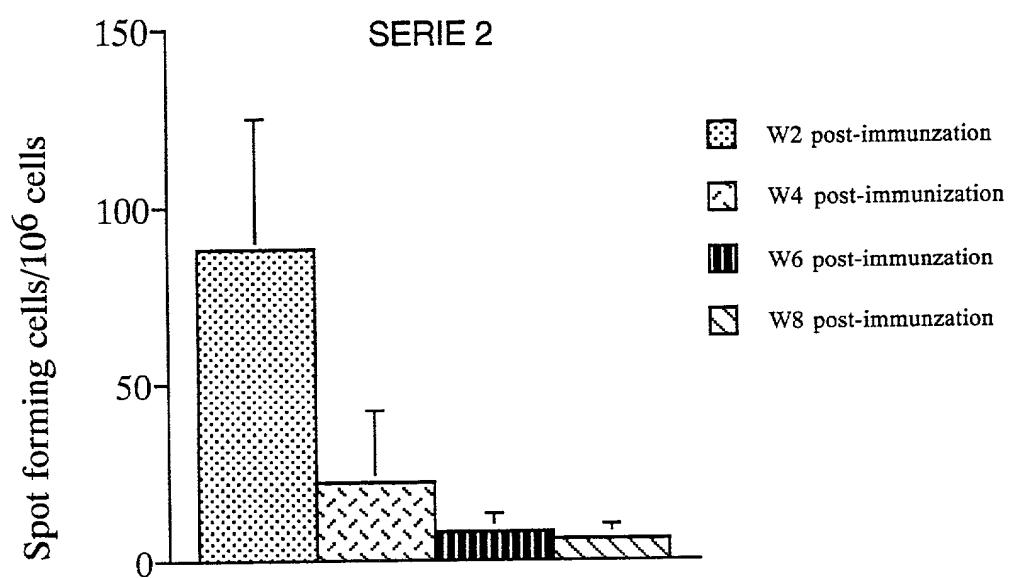
A.**B.**

FIGURE 15 L23: ELISPOT for $\text{IFN}\gamma$ secretion: Serie1 spleen cells from mice at week W13/2 (post-prime/boost)

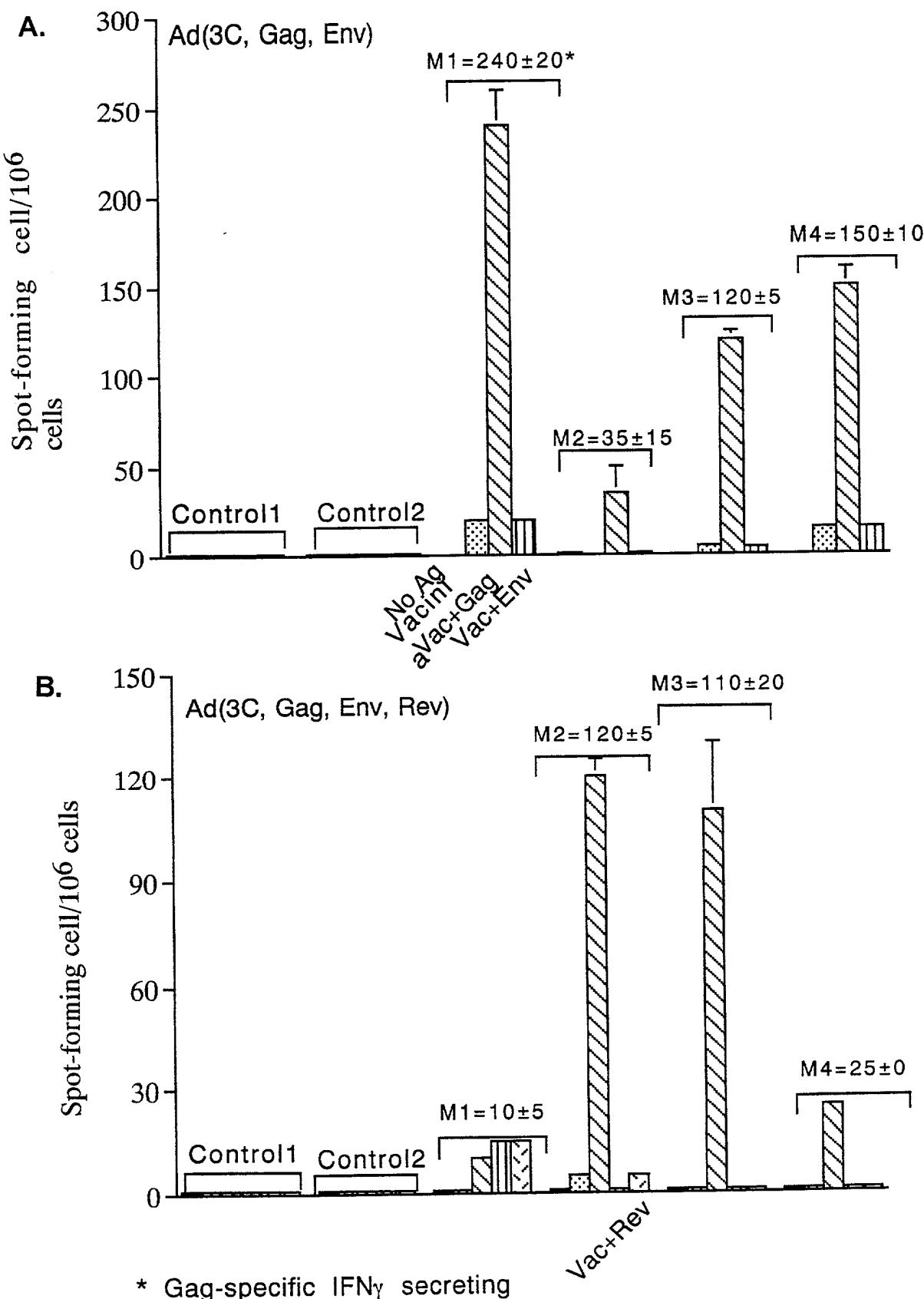
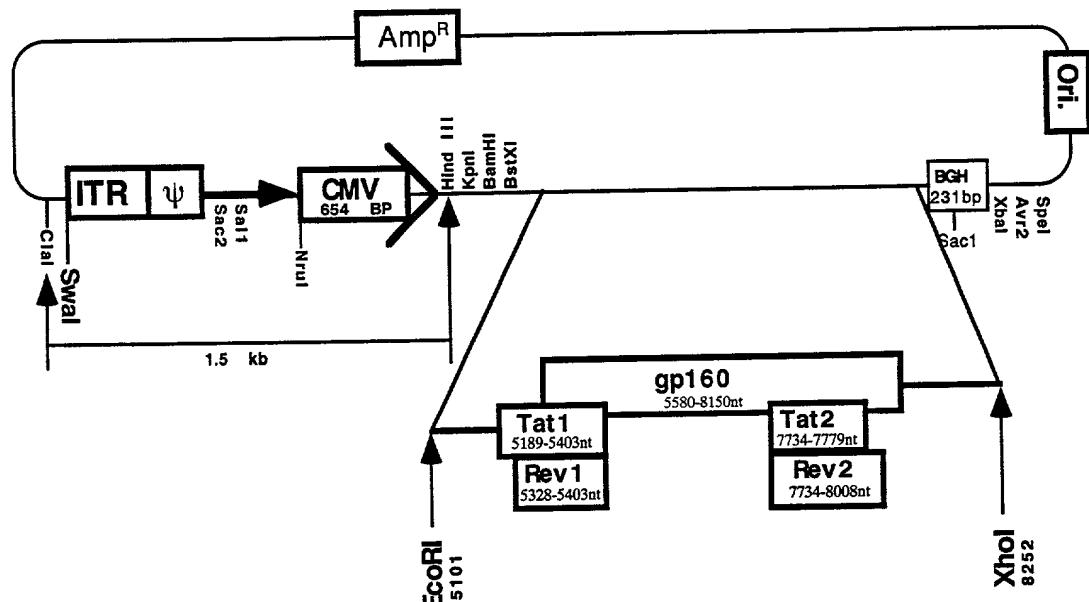


FIGURE 16 Ad-E.T.R/IL2 (from BH10 strain)

A. pLAd-E.T.R



B. pRAd.ORF6-IL2

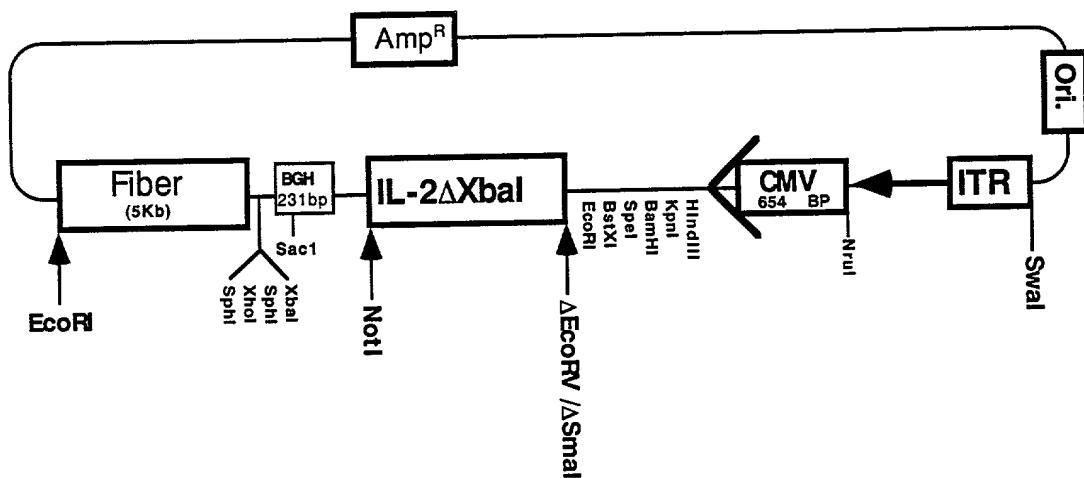
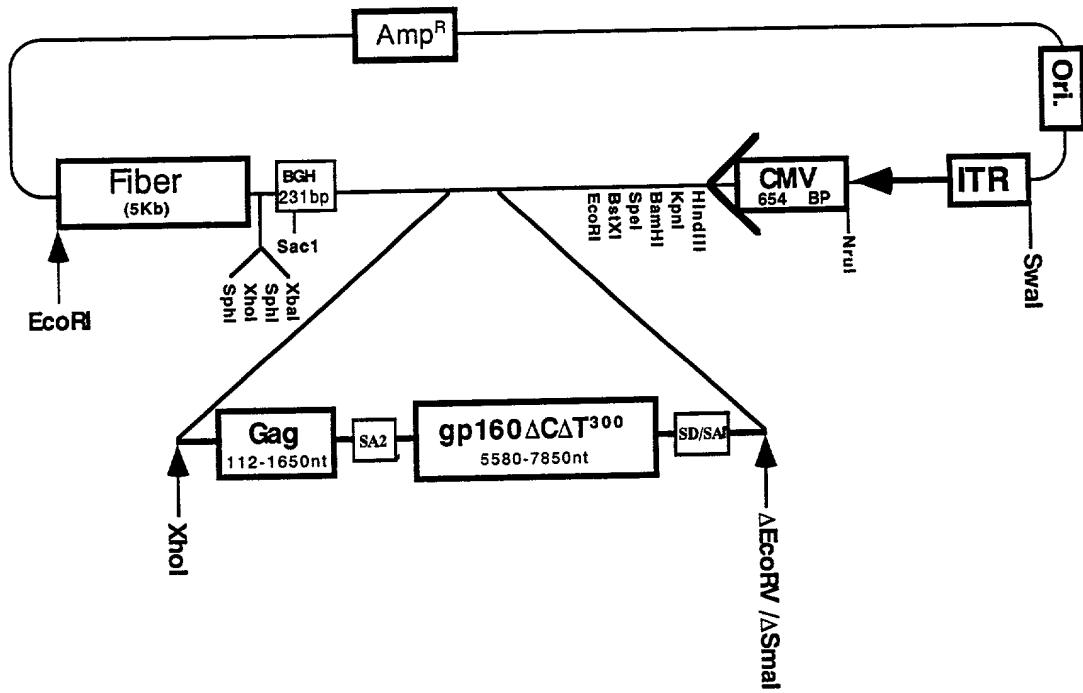


FIGURE 17 Ad-3C/E^mΔCΔT³⁰⁰-G (from BH10 strain)

A. pRAd.ORF6-E^mΔCΔT³⁰⁰-G



B. pLAd-3C

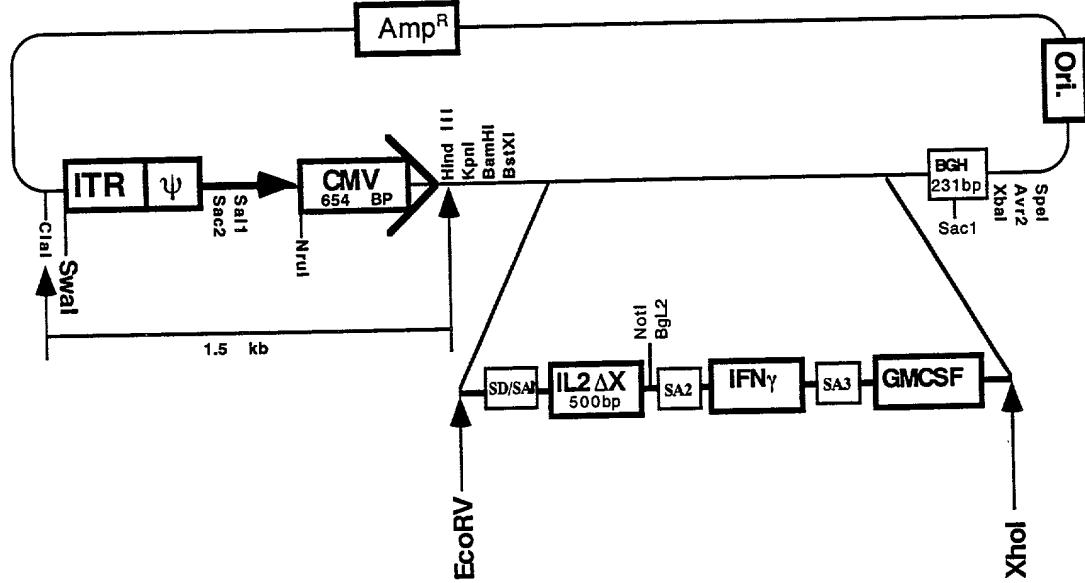


FIGURE 18

pRAd.ORF6-E^mΔCAT⁹⁹.T.R-G

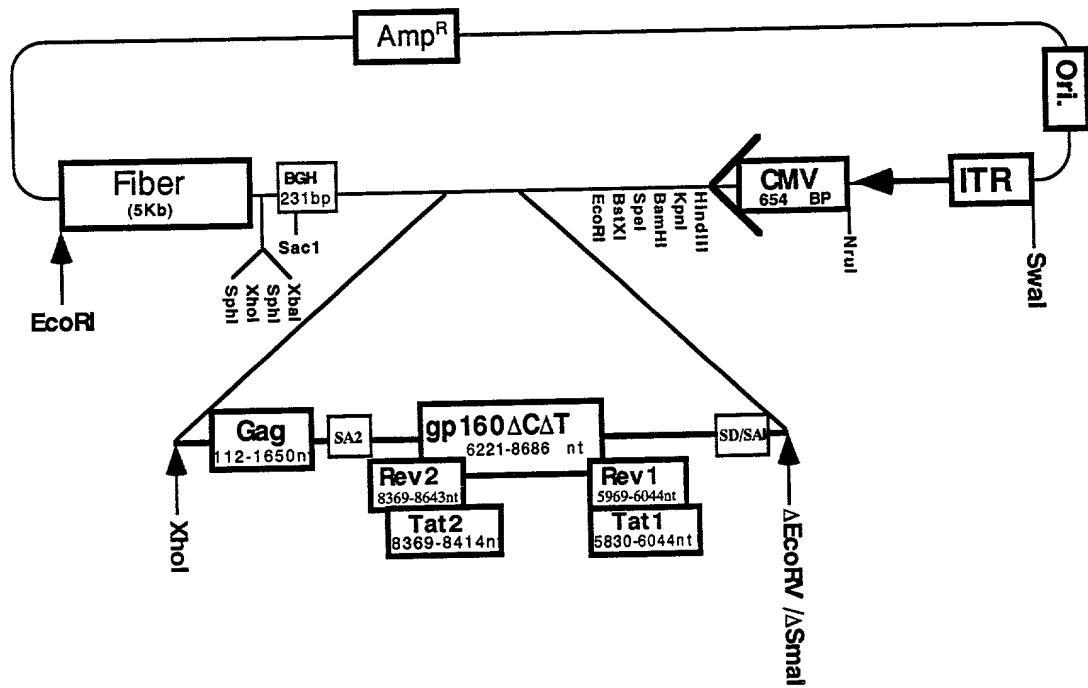
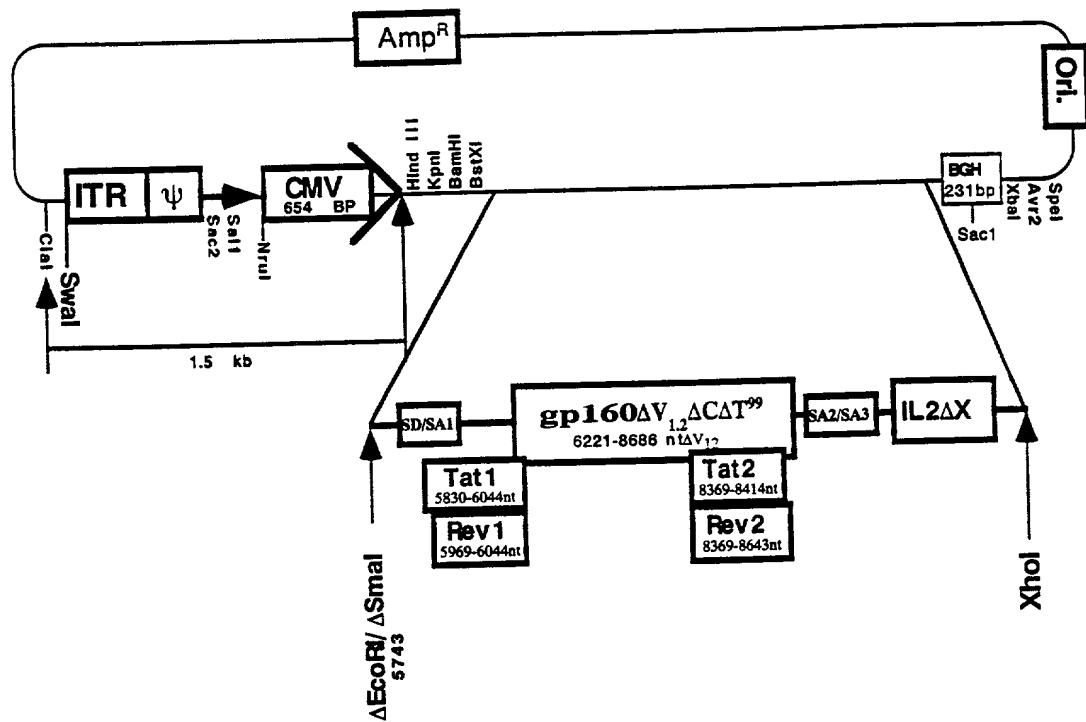


FIGURE 19

A. pLAd-E^mΔV_{1,2}ΔCAT.T.R-IL2



B. pRAd.ORF6-G.IL2

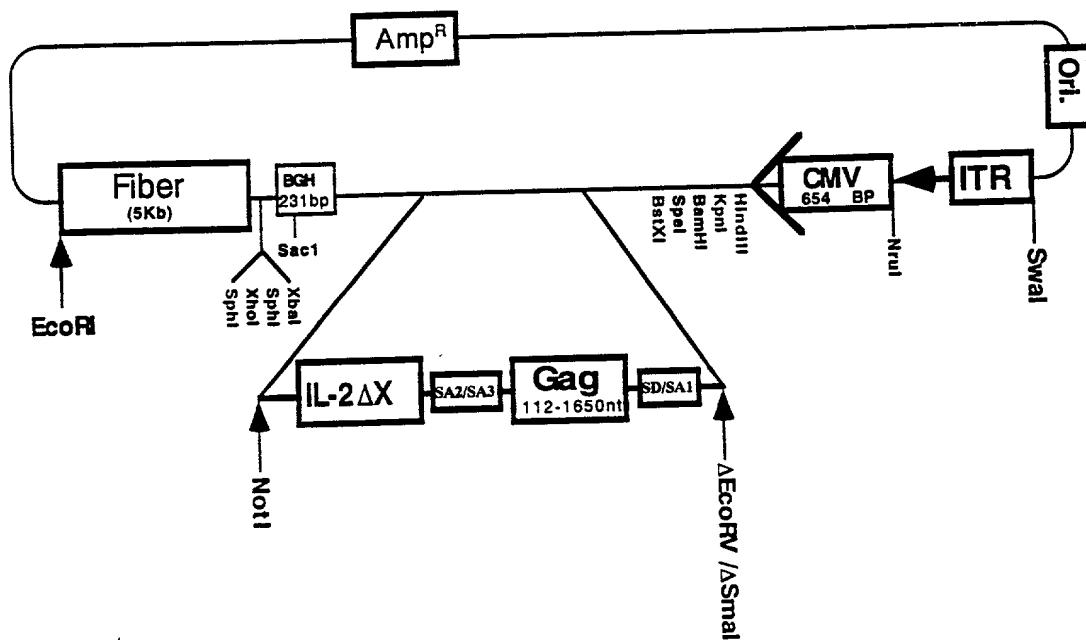


FIGURE 20

pLAd-ETRN

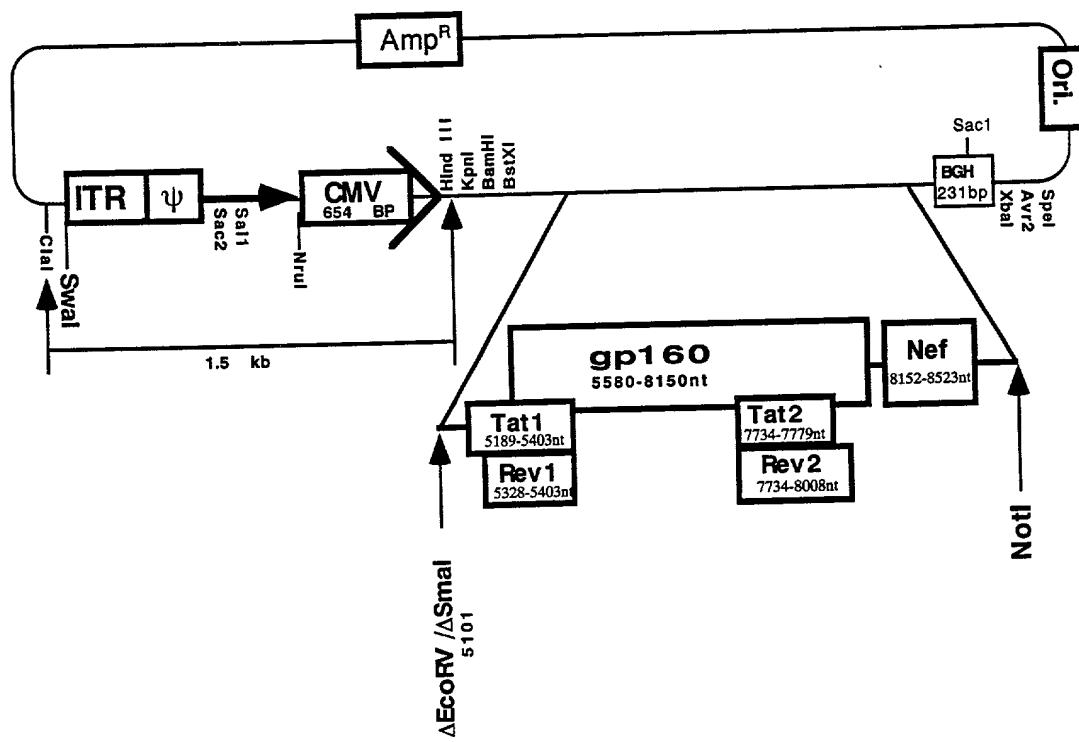


FIGURE 21

pLAd-E^mΔC.N

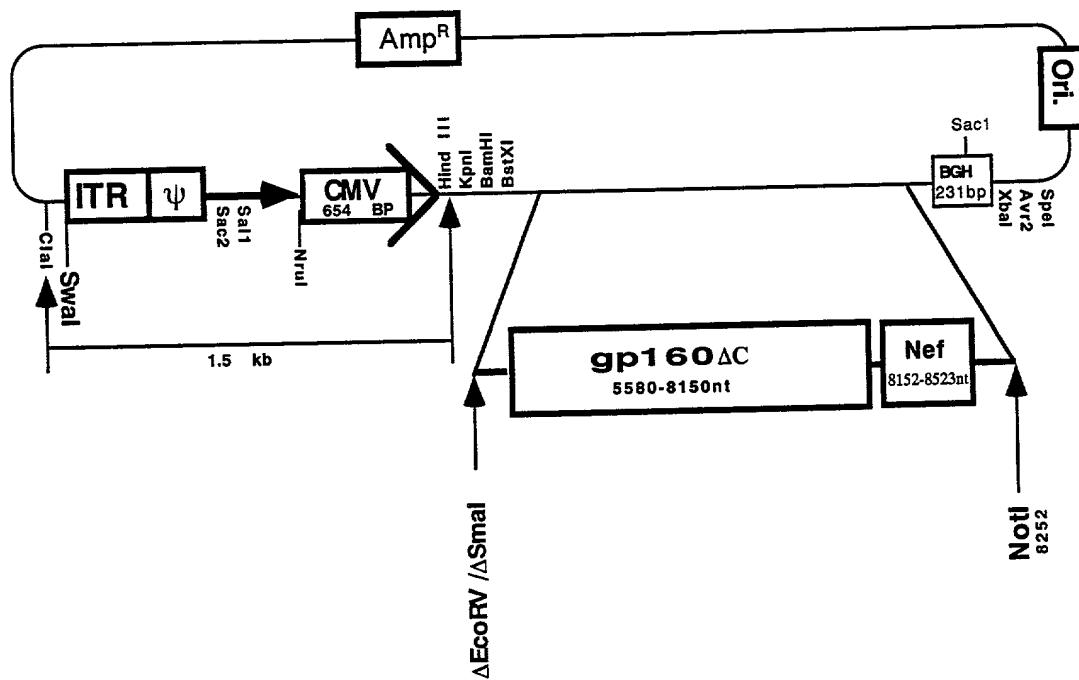


FIGURE 22

pLAd-E^mΔCΔT³⁰⁰.T

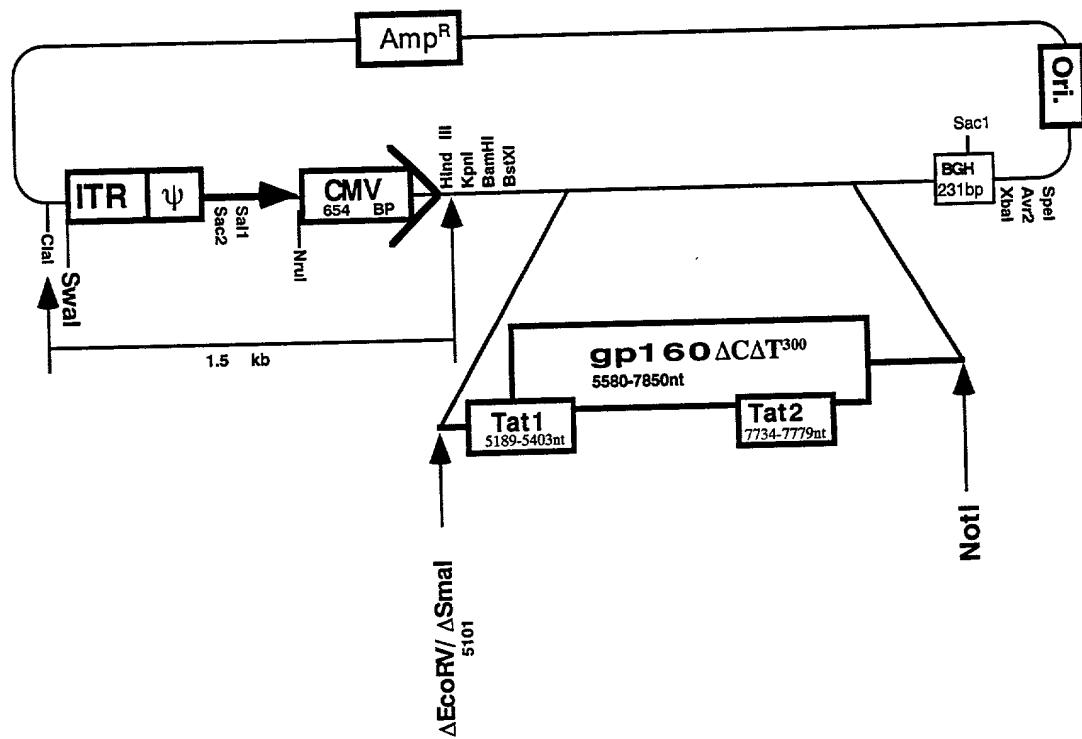
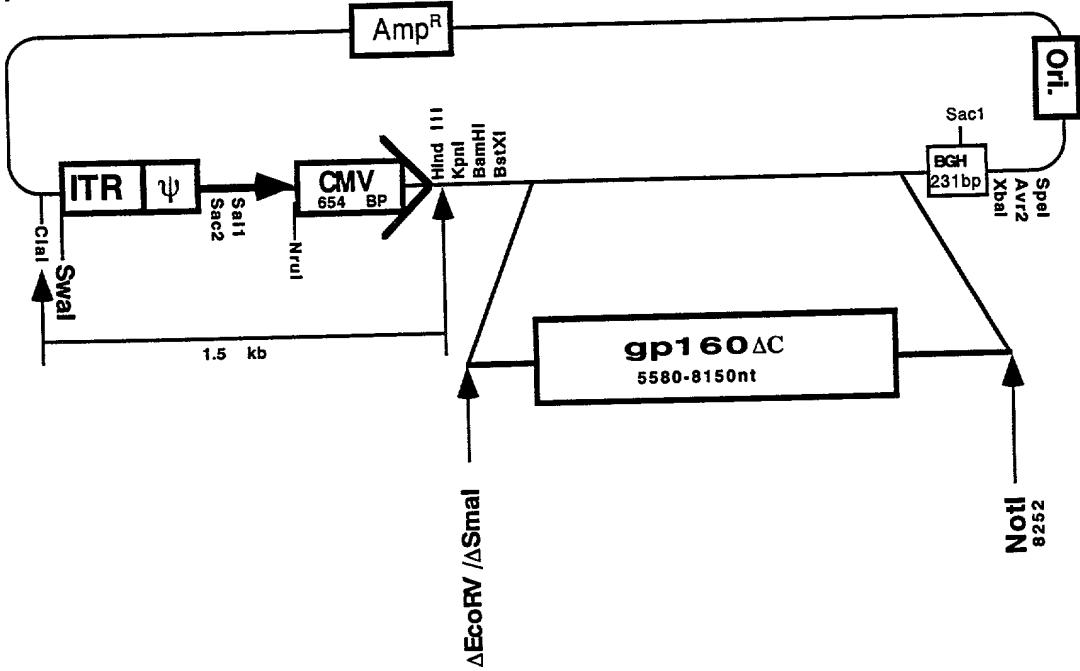


FIGURE 23

A. pLAd-E^mΔC



B. pRAd.ORF6-E^mΔC

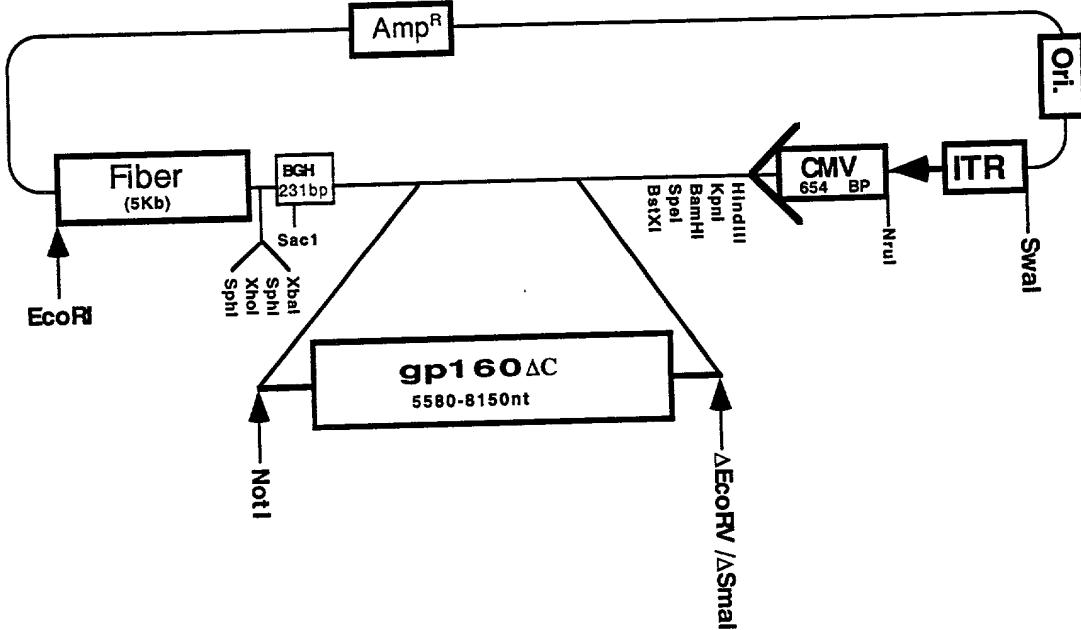
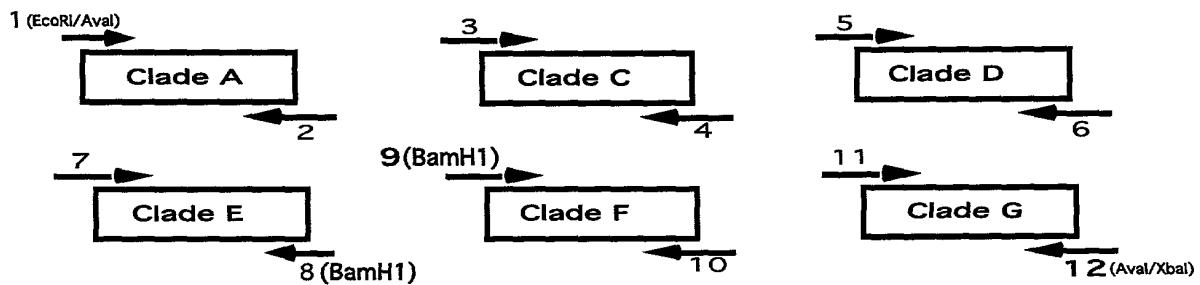
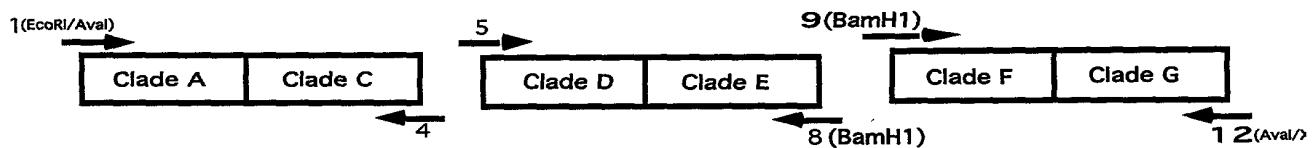


FIGURE 24

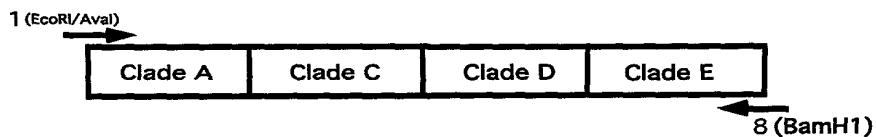
Step 1. Amplification of each individual clade A-G



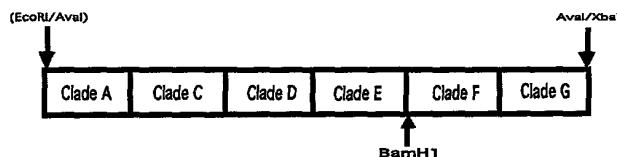
Step 2. Amplification of every two Clades AC, DE, FG



Step 3. Amplification of Clades ACDE



Step 4. Cloning the multi-clades into pSP73 vector



Step 5. Generating of a duplicated multi-clades

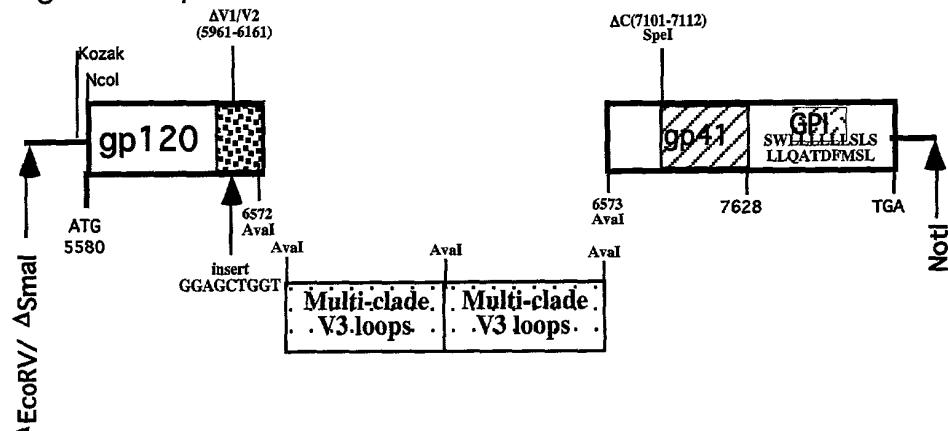


FIGURE 25

pLAd-E^m.V3

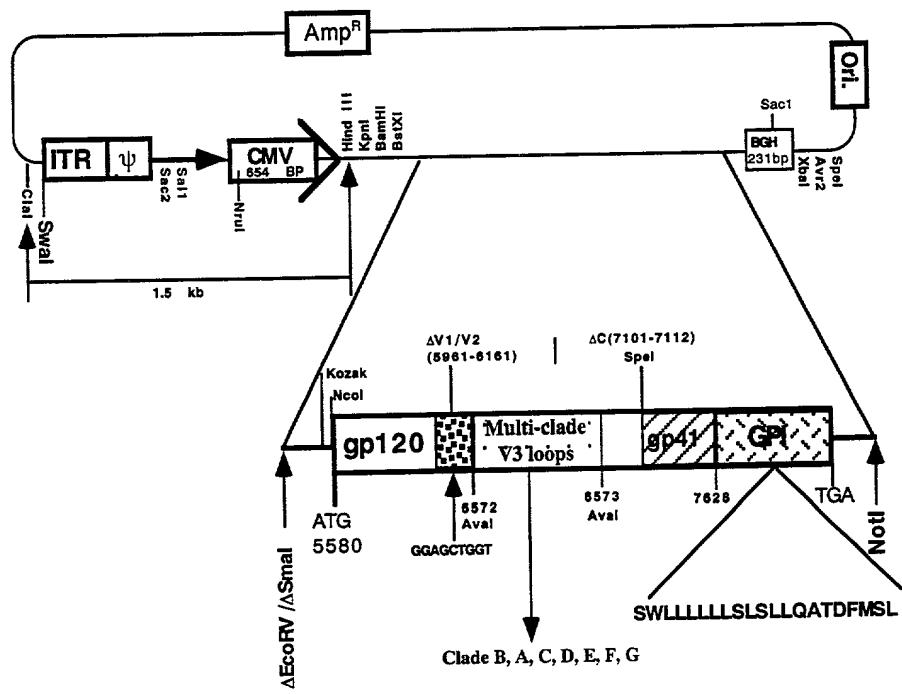


FIGURE 26

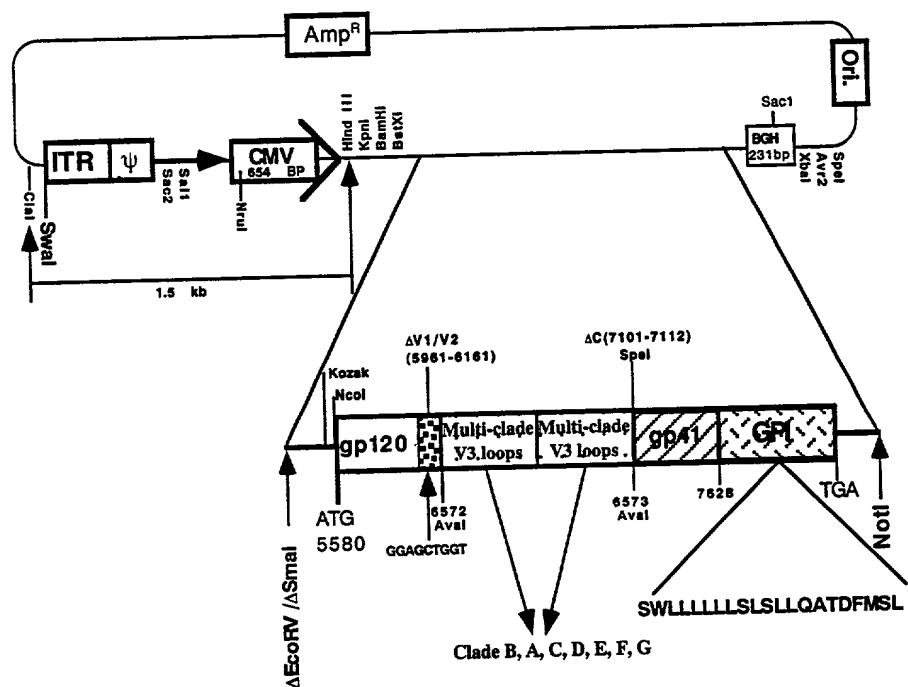
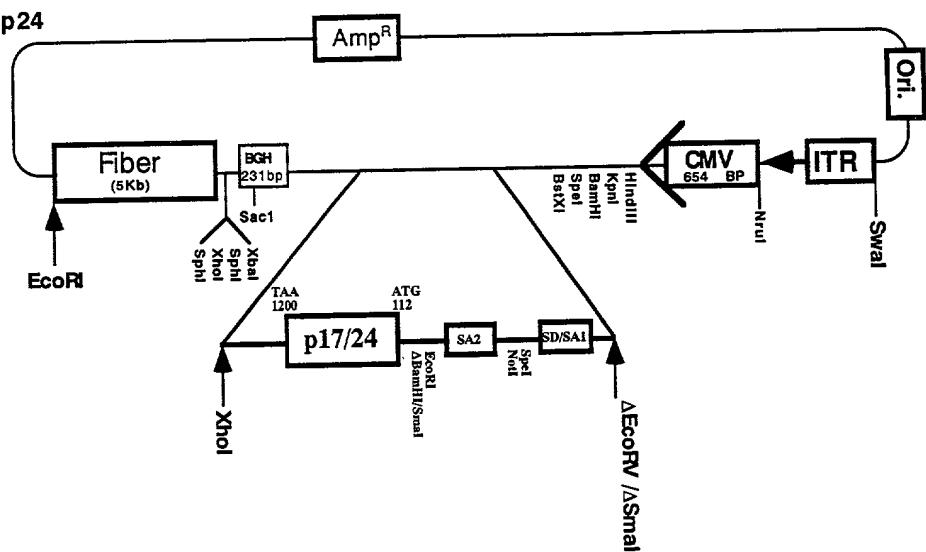
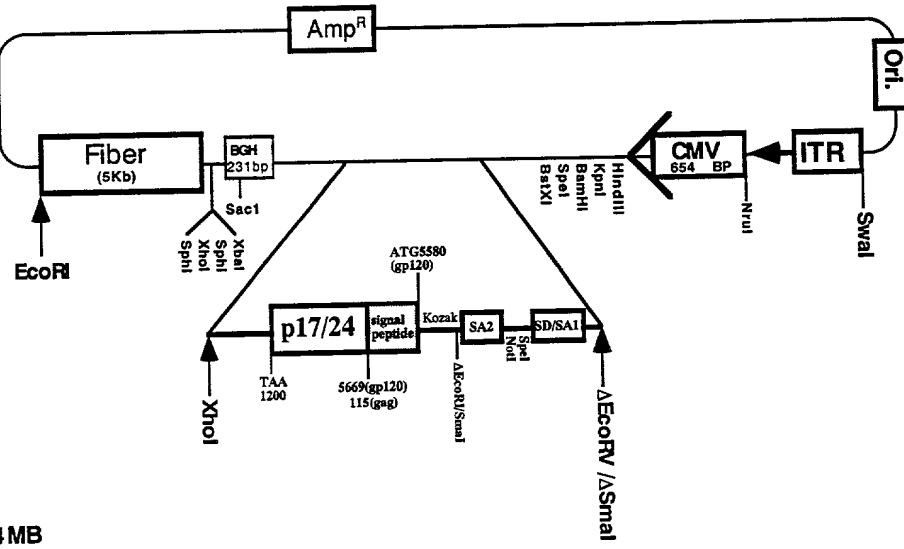


FIGURE 27

A. pRAd.ORF6-p17/ p24



B. pRAd.ORF6-p17/ 24sec



C. pRAd.ORF6-p17/ 24MB

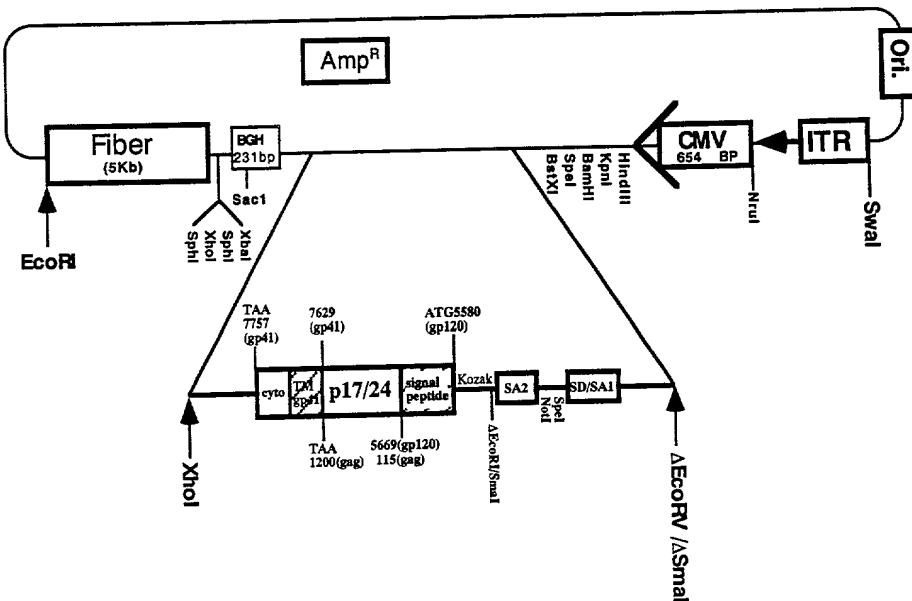
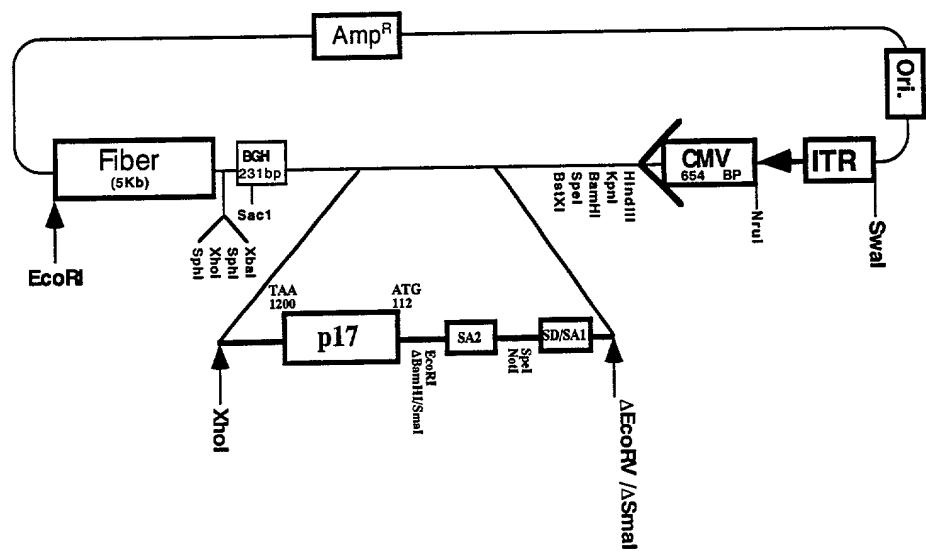
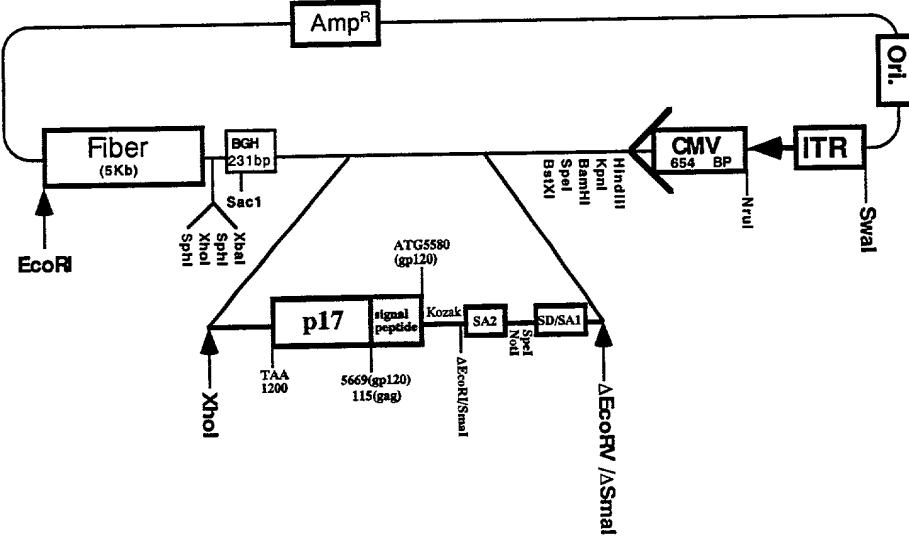


FIGURE 28

A. pRAd.ORF6-p17



B. pRAd.ORF6-p17sec



C. pRAd.ORF6-p17MB

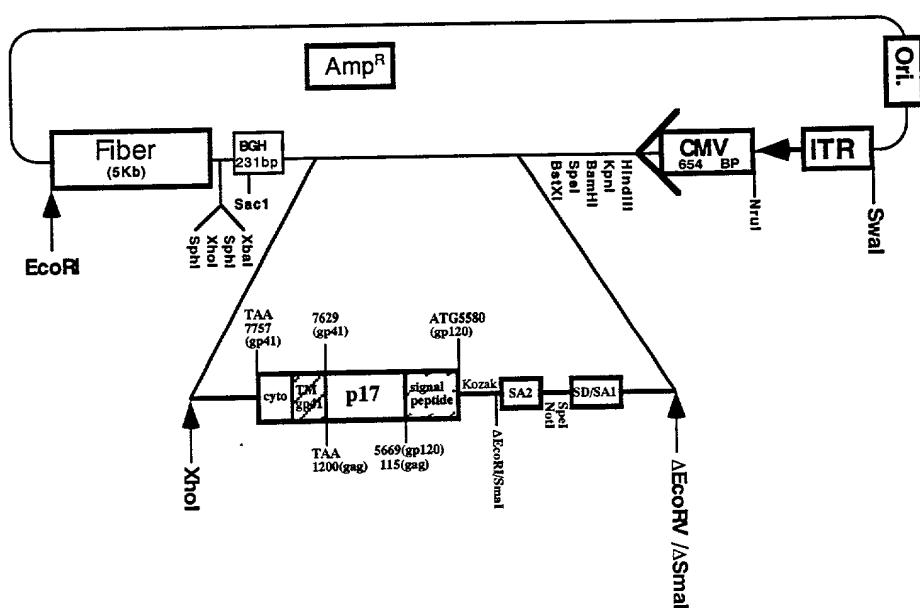
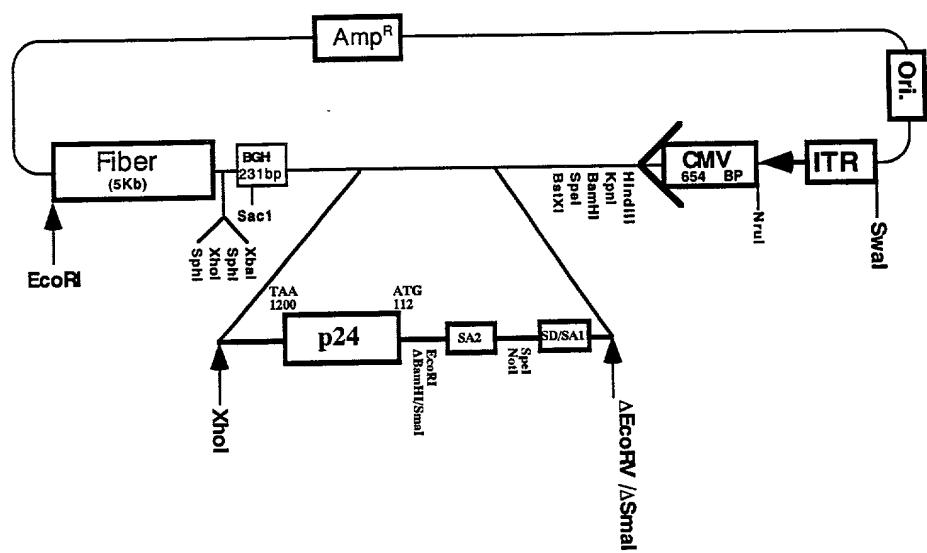
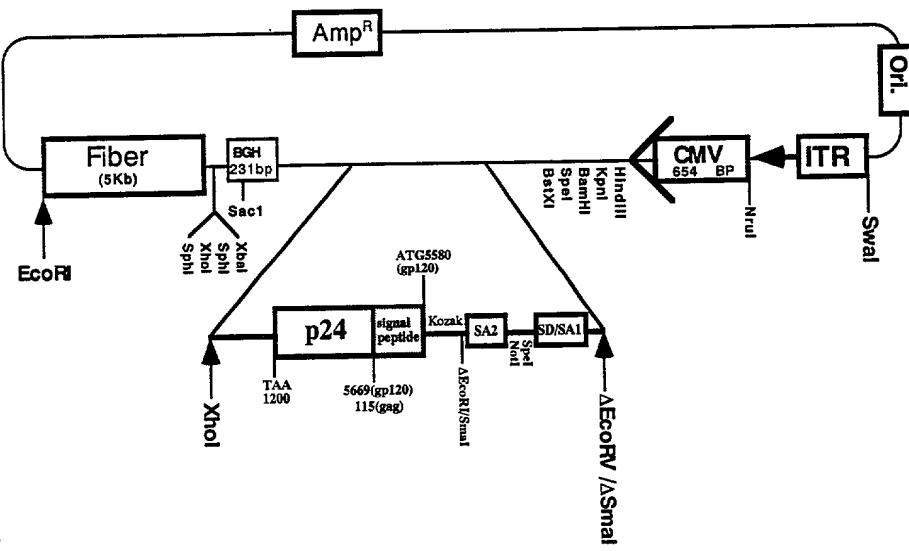


FIGURE 29

A. pRAd.ORF6-p24



B. pRAd.ORF6-p24 sec



C. pRAd.ORF6-p24 MB

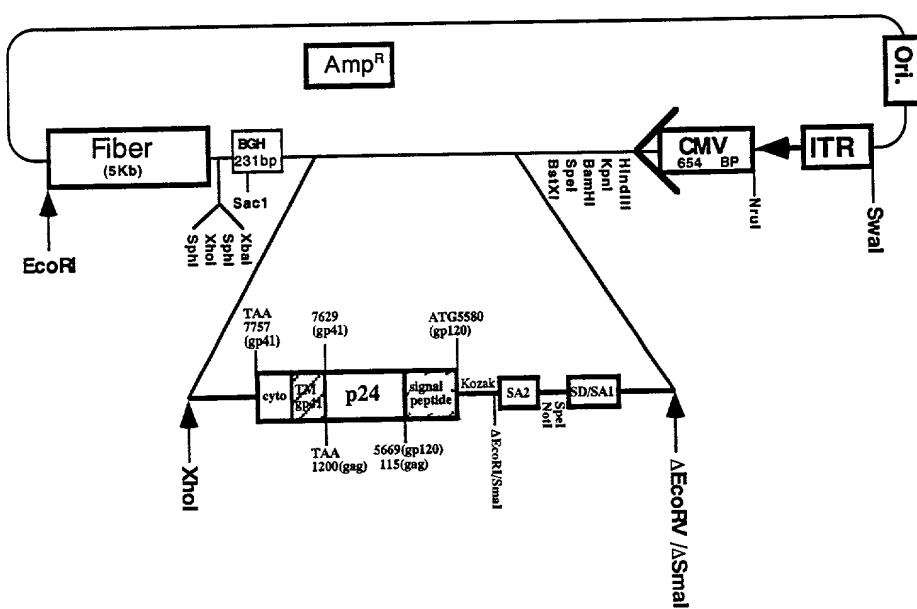


FIGURE 30 Adenoviral construct of Ad-E^m.V3^m/p17/24MB

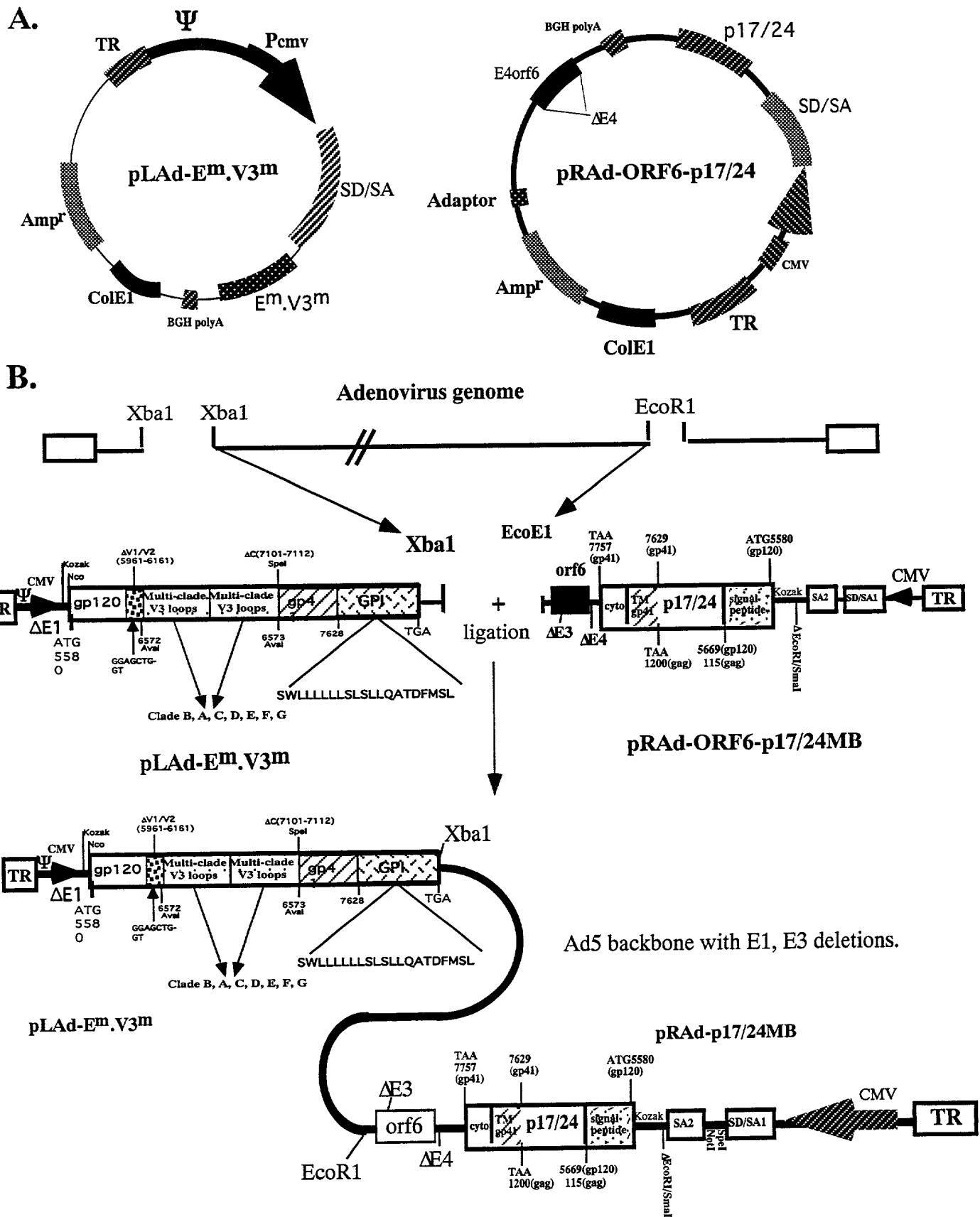


FIGURE 31 Adenoviral construct of Ad-Em.V3m/p17MB

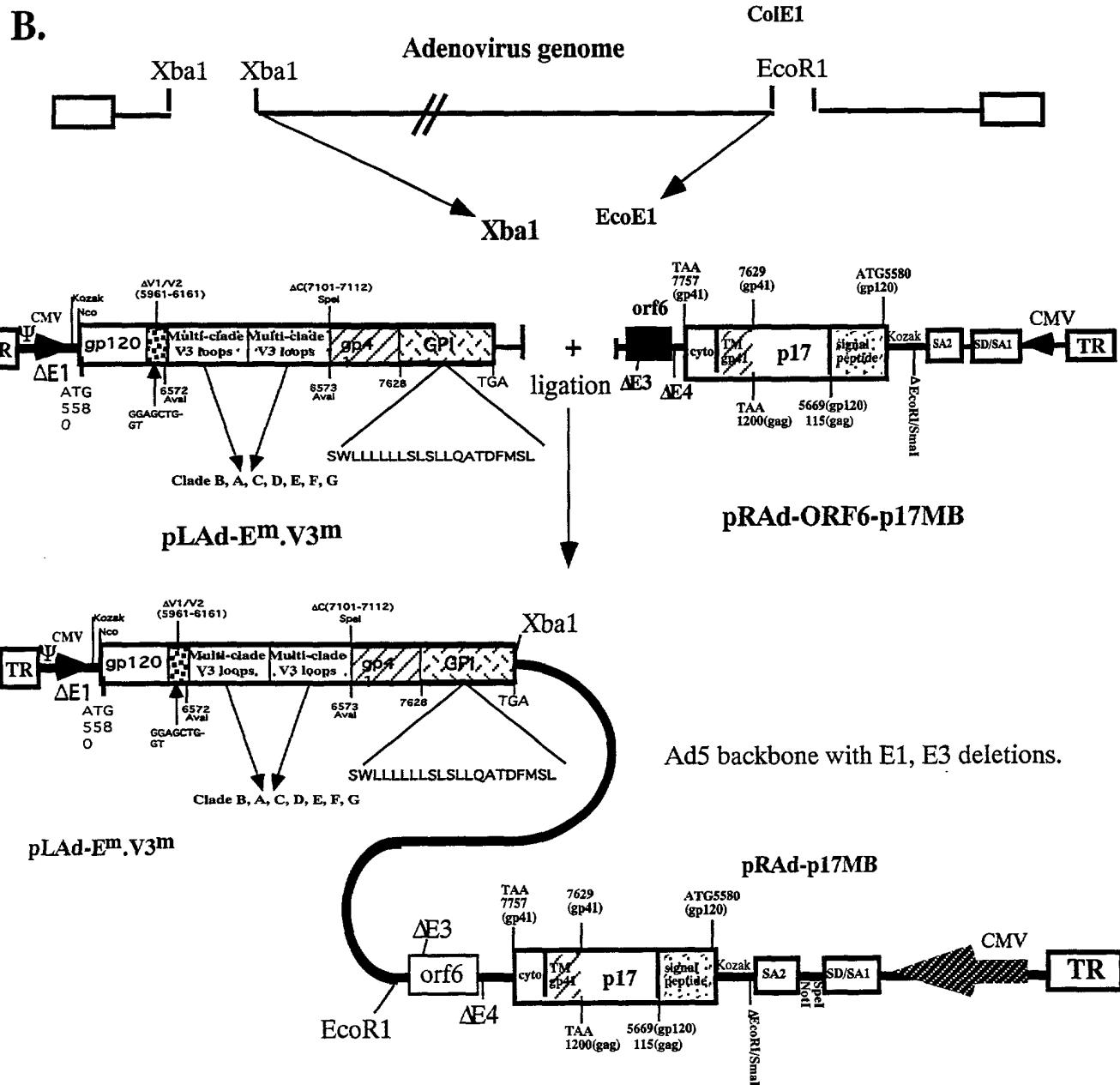
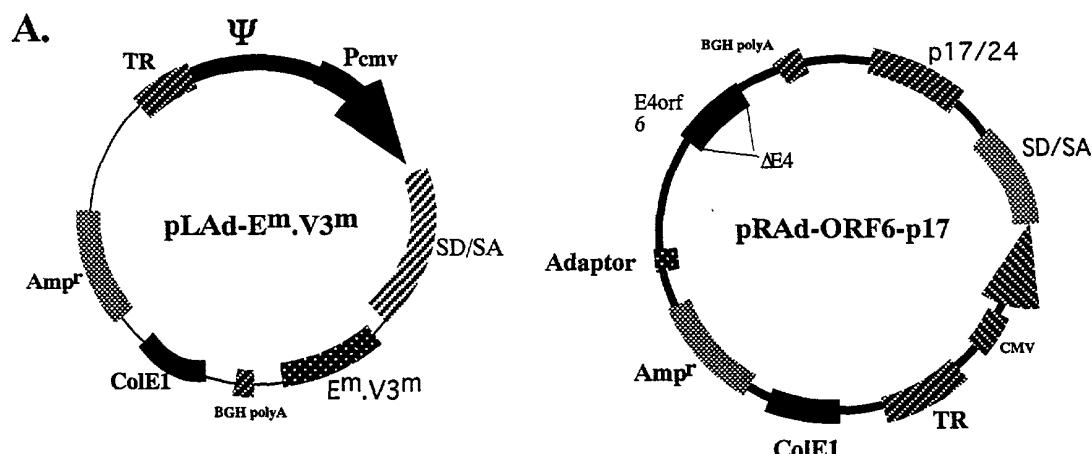


FIGURE 32 Adenoviral construct of Ad-E^m.V3^m/p24MB

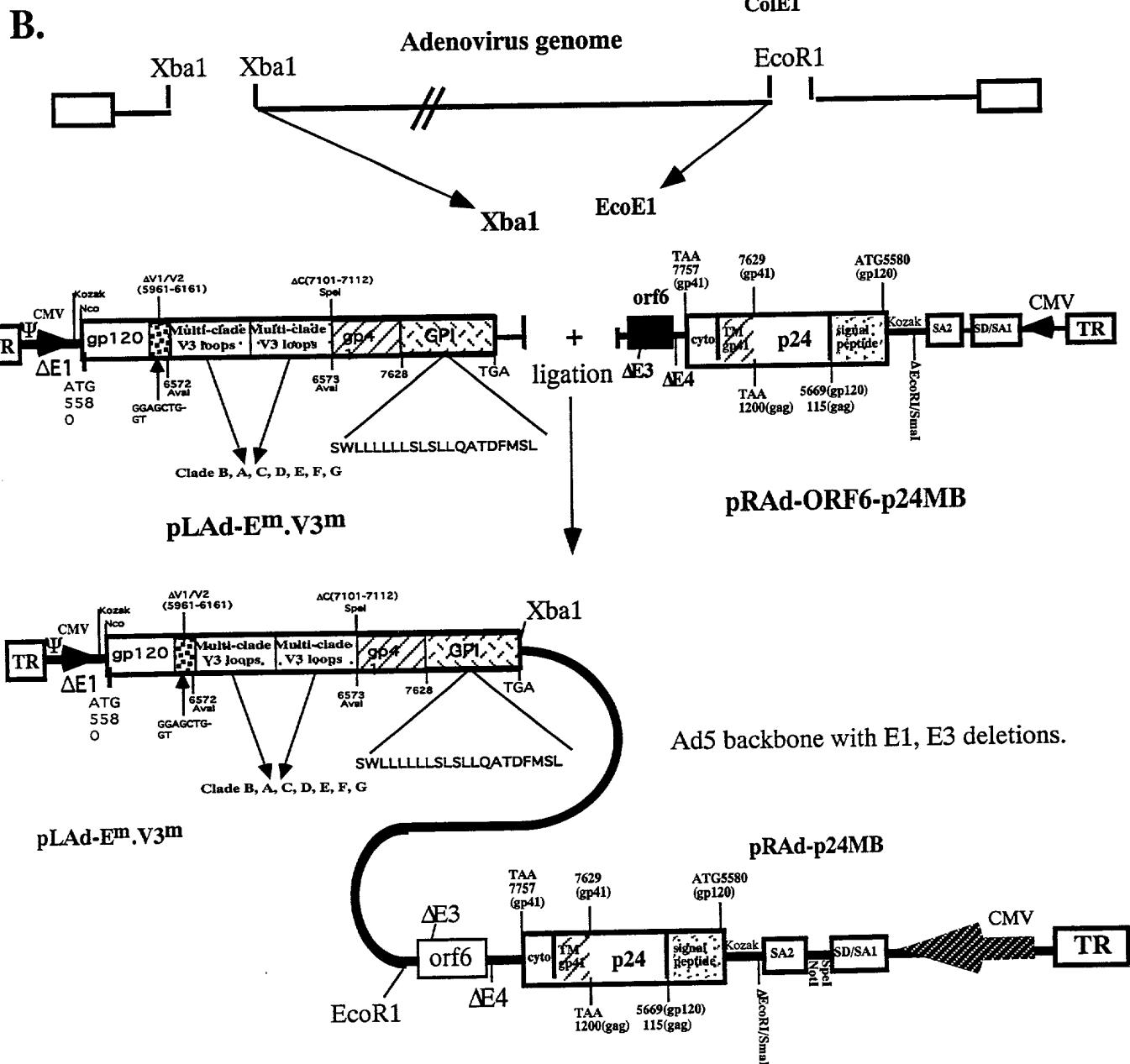
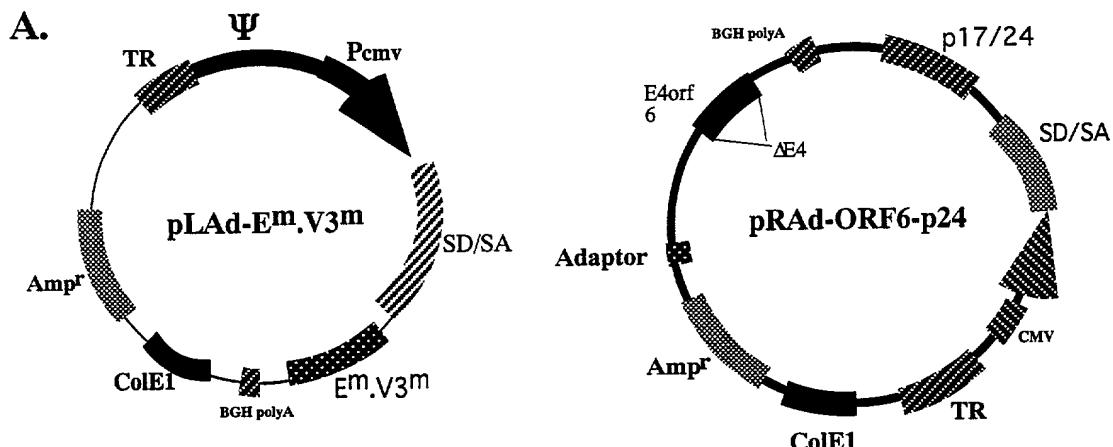


FIGURE 33

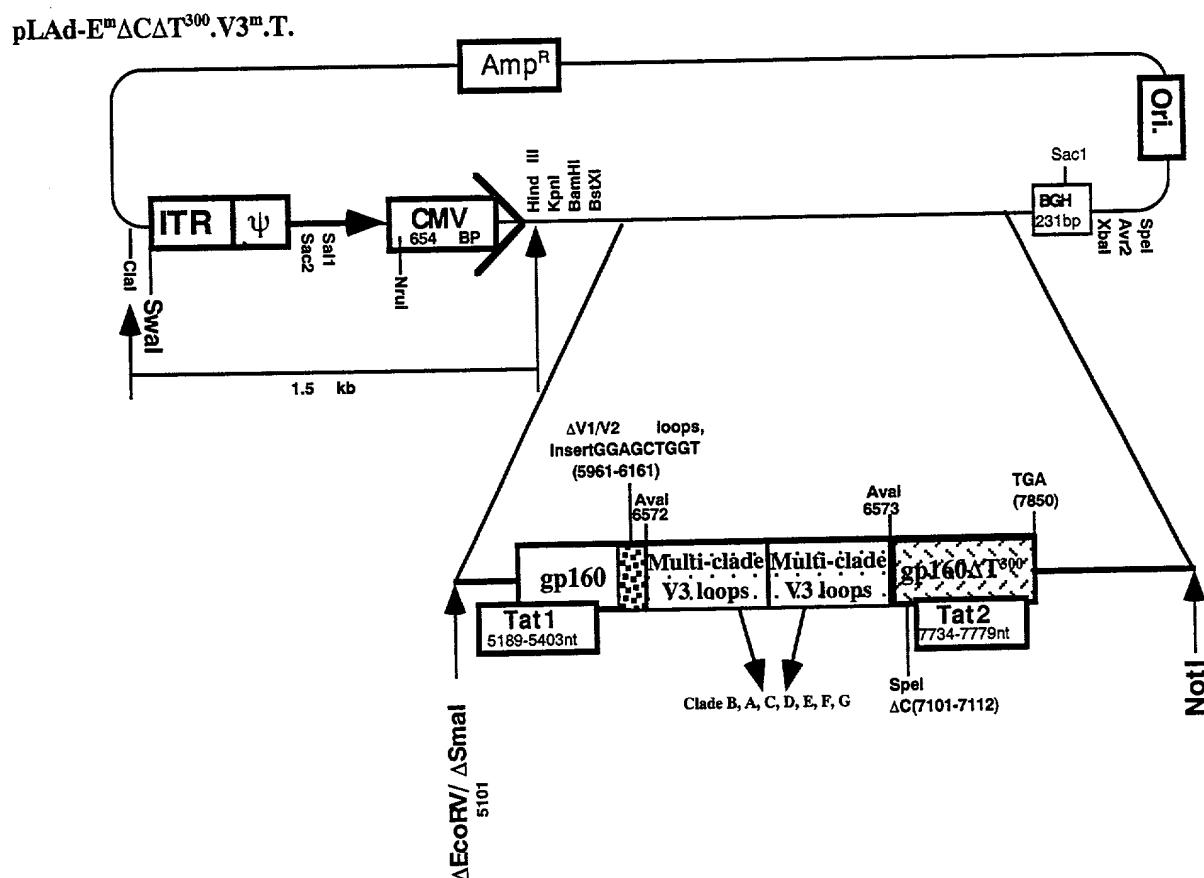
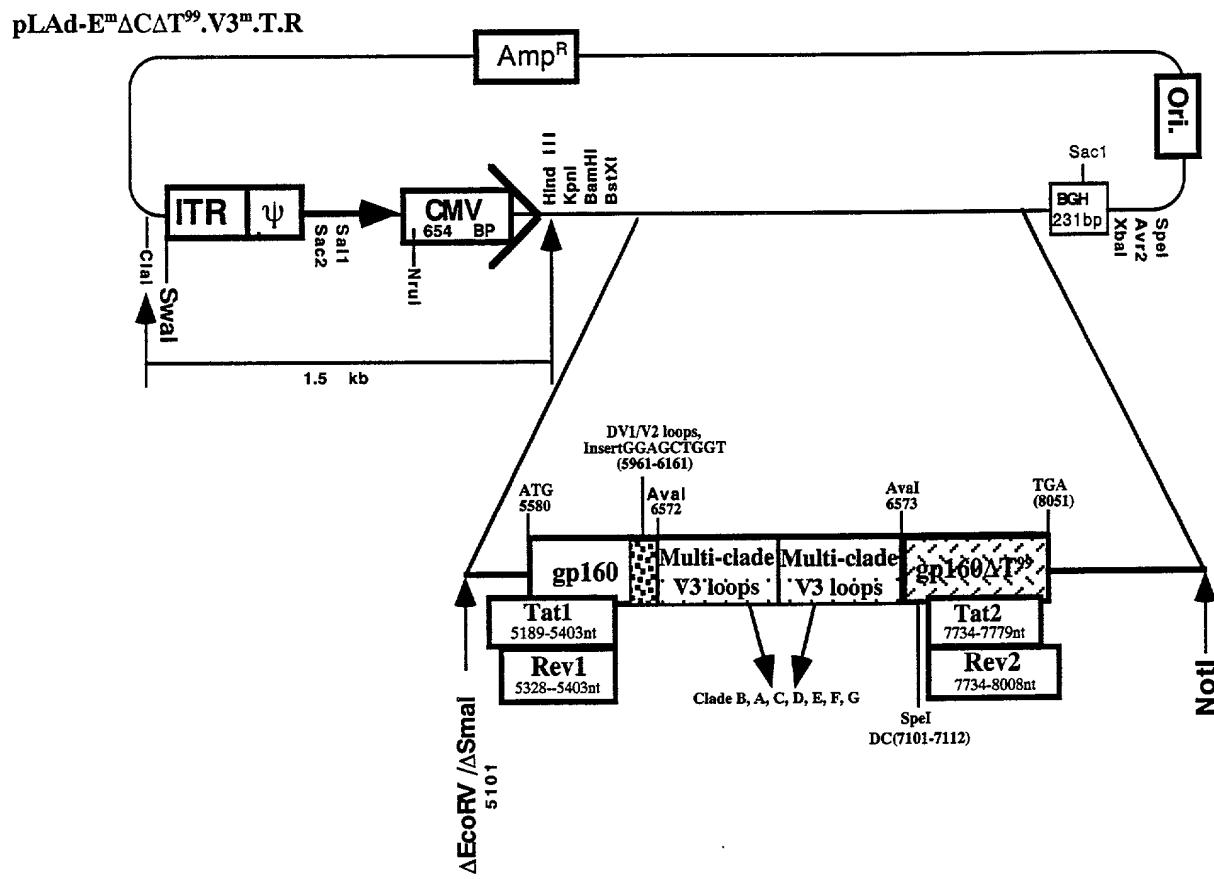


FIGURE 34



pRAD. ORF6-G.PI

FIGURE 35

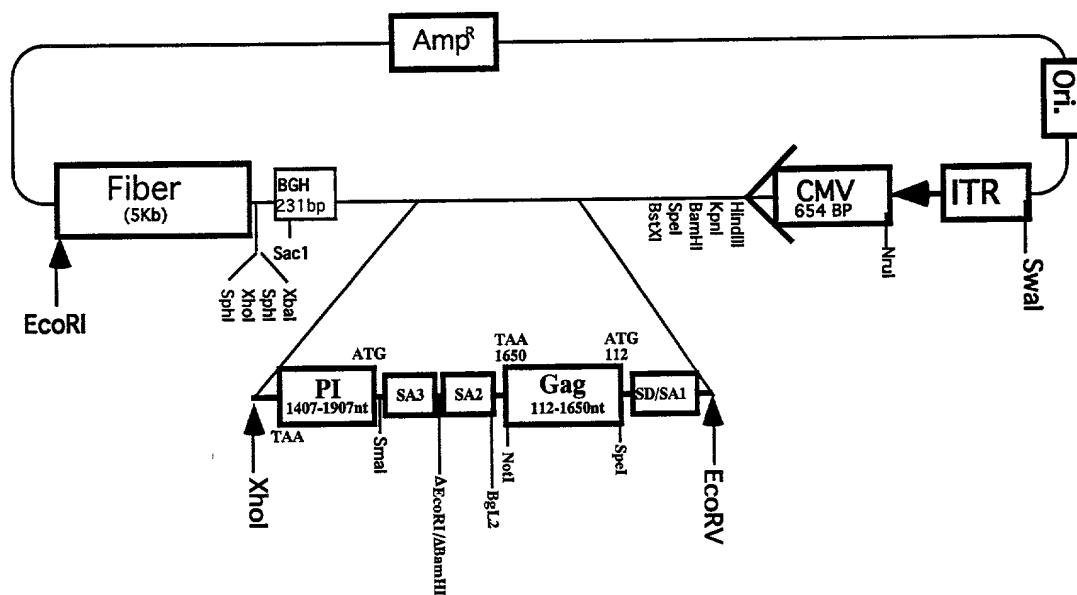


FIGURE 36

pRAd.ORF6-G-PI

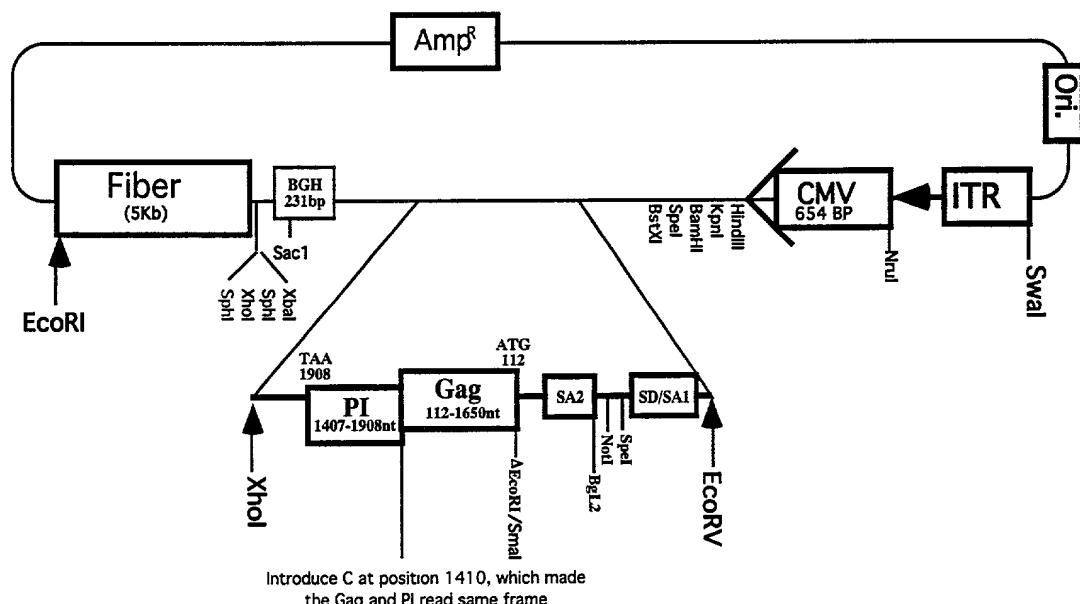


FIGURE 37

SD/SA1.2.3 vector

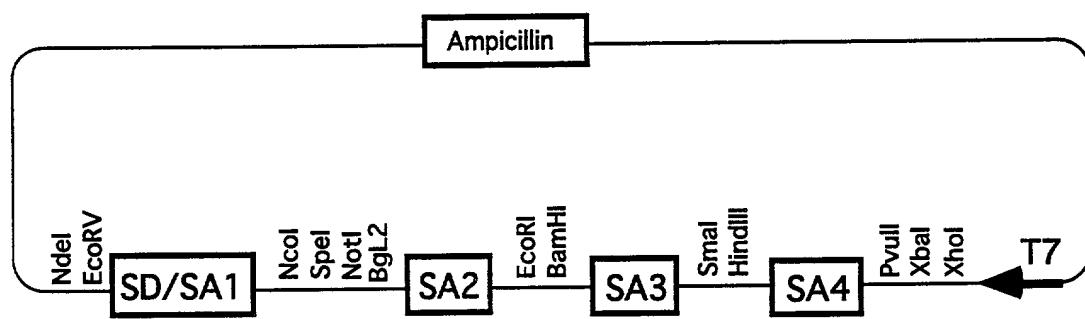


FIGURE 38

DNA Sequence of Env/Tat/Rev from BH10 clone [SEQ ID NO: 14]:

XhoI

FIGURE 39

DNA Sequence of IL-2 Δ X [SEQ ID NO: 15]:

Tcactctttaatcactactcacagtaacacctcaactcctgccacaatgt
caggatgcaactcctgtcttgcattgcactaagtcttgcacttgcacaaa
cagtgcacctacttcaagtttacaaaagaacacagctacaactggagca
tttactgctggatttacagatgatttgaatgaaattaataattacaagaa
tcccaaactcaccaggatgctcacatttaagtttacatgcccaagaaggc
cacagaactgaaacatcttcactgtct**t**gaagaactcaaacccttgga
ΔXbaI (cta → ctt)

Δ XbaI (cta \rightarrow ctt)

ggaaagtgtcaaatttagctcaaaggaaaaactttcacttaagaccaggga
cttaatcagcaatatacAACgtaatagttctggaaactaaaggatctgaaac
aacattcatgtgtgaatatgctgatgagacagcaaccattgtagaatttct
gaacagatggattacctttgtcaaagcatcatctcaacactaacttga

FIGURE 40

DNA Sequence of Env^mΔCAT³⁰⁰ (HIV strain BH10) [SEQ ID NO: 16]:

Gaattcggccacccatgggagtgaaggagaaatcagcacttgtggagatg
EcoRI Kozak NcoI
ggggtggagatggggcaccatgctccttggatgttgcgtatctgtgtgtgtacagaaaaaa
tttgtgggtcacagtcttattatgggtacctgtgtggaaaggcaaccaccactcttatttt
gtgcacatcagatgctaaagcatatgatacagaggtacataatgttggccacacatgcctg
tgtaccacagaccccaacccacaagaagttagtattggtaatgtgacagaaaaattttac
atgtggaaaaatgacatggtagaacagatgcgtgaggatataatcagttatggatcaaa
gcctaaagccatgtgtaaaatttacccactctgtgttagttaaagtgcactgattgaa
gaatgataactaataccatagtagtagcggagaatgataatggagaaaggagagataaaa
aactgccttcaatatcagcacaagcataagaggtcagaaagaatatgcatttt
tttataaacttgatataatccatagataatgataactaccagctatacgttgacaaagttg
taacacctcagtcattacacaggcctgtccaaaggatccttgagccaattccatacat
tattgtccccggctgggtttgcattctaaaatgtataataagacgttcaatggAACAG
gaccatgtacaaatgtcagcacagtacaatgtacacatggattaggccagtagtatcaac
tcaactgctgttaatggcagtctggcagaagaagaggttagtaattagatctgccaatttc
acagacaatgctaaaaccataatagtacagctgaaccatctgttagaaattaattgtacaa
gacccaacaacaatacaagaaaaatccgtatccagagaggaccaggagacattgt
tacaataggaaaaataggaaatatgagacaagcacattgttaacattagtagagcaaaatgg
aataacactttaaaacagatagatagcaaattaagagaacaatttggaaataataaaacaa
taatctttaaggcagtcctcaggagggaccaggaaattgttaacgcacagtttattgtgg
agggaaatttttctactgttaattcaacacaactgtttaatagtacttggttaatagtact
tggagtactaaagggtcaaataacactgaaggaagtgcacacaatcaccctccatgcagaa
taaaacaaattataaacatgtggcaggaagttagaaaaagcaatgtatgcccctccatcag
tggacaaatttagatgttcatcaaatattacagggctgttattacaagagatgtggtaat
agcaacaatgagtccgagatcttcagacctggaggagatgtggacaatttggagaa
gtgaatttatataatataaagttagtaaaaattgaaccattaggagtagcaccaccaaggc
aaagagaagagtggcagACTAGTgcagtggaaataggagctt

ΔCleavage site (**agagaaaaaaga**) → SpeI

tgttccttgggttcttggggcagcagcactatgggcgcagcgtcaatgacgctgac
ggtacaggccagacaattattgtctgttatagtgcgcgcagcacaatttgctgagggt
attgaggcgcaacagcatctgttcaactcacagtctggggcatcaagcagctccaggcaa
gaatcctggctgtggaaagataccctaaaggatcaacagctcctgggatttgggttgctc
tggaaaactcattgcaccactgtgtgccttggaaatgttagttggagtaataatctctg
gaacagatttggaaataacatgacccatggatggagttggacagagaaaaattacaattacaaa
gcttaatacactccttaattgttgcagatggggatttgggttacataacaaattggctgtgg
atttggaaatttagataatggcaagttgttgcattttggatgttttttttttttttttttttt
tatataaaaatttattcataatgtatgttagggaggcttggtaggttttttttttttttttt
tactttctgttagtgaatagatgttaggcaggatattcaccattatcgtttcagacccac
cccaatcccgggggacccgcacaggcccgaaggaatagaagaagaaggtggagagagag
agagacagatccattcgatttagtgaacggatccttagcacttatctgttaa

FIGURE 41A

DNA Sequence of Full length HIV-1 Gag [SEQ ID NO: 17]:

ggctagaaggagagaggatgggtgcgagagcgtcagtattaagcggggag
aattagatcgatggaaaaattcggttaaggccagggggaaagaaaaat
ataaaattaaaacatatagtatggcaagcagggagctagaacgactacaac
catcccttcagacaggatcagaagaacttagatcattatataatacagtag
caaccctctattgtgtcatcaaaggatagagataaaagacaccaaggaag
cttagacaagatagaggaagagcaaaacaaaagtaagaaaaagcacagc
aagcagcagctgacacaggacacagcagtcaggtcagccaaaattacccta
tagtgcagaacatccagggcaaattgttacatcagccatattcacctagaa
ctttaaatgcatggtaaaagttagtagaagagaaggcttcagcccagaag
taataccatgtttcagcattatcagaaggagccaccccacaagattaa
acaccatgctaaacacagtgggggacatcaagcagccatgcaaattgttaa
aagagaccatcaatgaggaagctgcagaatggatagagtacatccagtgc
atgcagggcctattgcaccaggccagatgagagaaccaagggaaagtgaca
tagcaggaactacttagtacccttcaggaacaaaataggatggatgacaata
atccacctatcccagttaggagaaatttataaaagatggataatcctggat
taaataaaatagtaagaatgtatagccctaccagcattctggacataagac
aaggacaaaagaaccccttttagagactatgttagacccgttataaaactc
taagagccgagcaagcttcacaggagtaaaaaattggatgacagaaacct
tggttgtccaaaatgcgaacccagattgttaagactatttaaaagcattgg
gaccagcggctacactagaagaaatgtacagcatgtcagggagtaggag
gaccggccataaggcaagagtttggctgaagcaatgagccaagtaacaa
atacagctaccataatgtacagagaggcaattttaggaaccaagaaaga
tggttaagtgtttcaattgtggcaaagaagggcacacagccagaaattgca
ggcccttaggaaaaaggctgtggaaatgtggaaaggaaggacaccaaa
tgaaagattgtactgagagacaggctaatttttaggaaagatctggcctt
cctacaagggaaggccagggatatttcttcagagcagaccagccaaacag
ccccaccattcttcagagcagaccagccaaacagccccaccagaagaga
gcttcaggtctgggttagagacaacaactccccctcagaagcaggagccga
tagacaaggaactgtatccttaacttccctcagatcactcttggcaacg
accctcgtaataa

FIGURE 41B

Amino Acid Sequence of HIV-1 (Strain BH10) Gag [SEQ ID NO: 18]:

W I S Q Q S H K T M H S N L G A Q T A M G W N Q T Q L
R H G H E S V E A A V G T G Q R V A K M C C A L P P S
D K T V E H M E G A R R M L R L L A H I N G Q F E P R
L L Q C E G Q V E Q D P W I I T L P G T F K R N P T L
E K L Y I T G V S H W E G I D K T G P A C K E G R T S
G Y S L K D Q K L G E R I W L Y E L G T K R T P S T T
G K P T D A I V A G A M Q R I F T A G N V P C R Q E L
S K Q A L A N W S V A Q E K S R M K V T M A D G L V P
L K L V A A Q A F T E G Q Y T D W L G V K R K K F G Y
V G R T E Q V N M N E P L I P V N I Q Q R C M Y P S L *
S G E N K Q I L P L N A T E S Y K T C S Q N Q S P R E Q
A P L Y T A P T I M I I S G Y D V K A M N R H P A F K S
R R E L D K Y R V T T P T V M R E C T A R A G W T S D S
A L R S K K N P E N E G T P R F Q D M E F T E I P E I P
G R S R I K Q S P L K A G I V P S P M A N H K K E E P D
M I A L E S S I S D L H A P I E A N E L G G G P P E N

FIGURE 42

DNA Sequence of E^mΔCΔT⁹⁹.T.R (HIV strain pNL4-3) [SEQ ID NO: 19]:

ΔCleavage site (agagaaaaaaaga) → SpeI

gtgtctggggagcagcaggaagactatggctgcacgtcaatgacgctgacggtaacggccagacaattatt
gtctgatatagtgcagcagcagaacaatttgctgaggctattgaggcgcaacagcatctgttgcactcaca
gtctgggcatcaaacagctccaggcaagaatcctggctgtggaaagatacctaaaggatcaacagctcctgg
ggattttgggttgcctggaaaactcattgcaccactgctgtgccttggatgcttagttggagtaataatc
tctggAACAGATTGGAATAACATGACCTGGATGGAGTGGACAGAGAAAATTACACAGCTTAATA
CACTCCTTAATTGAAGAATCGCAAAACCAAGCAAGAAAAGAATGAACAAGAATTATTGGAATTAGATAAATGG
CAAGTTTGTGGAATTGGTTAACATAACAAATTGGCTGTGGTATATAAATTATTCTATAATGATAGTAGGAGG
CTTGGTAGGTAAAGAATAGTTTGTACTTCTATAGTAATAGAGTTAGGCAGGGATATTCACTTAC
TCGTTTCAGACCCACCTCCCAATCCCGAGGGGACCCGACAGGCCGAAGGAATAGAAGAAGGTGGAGAGA
GAGACAGAGACAGATCCATTGATTAGTAACCGGATCCTAGCACTTATCTGGACGATCTGCGGAGCCTGT
CCTCTTCAGCTACCACCGCTTGAGAGACTACTCTGATTGTAACCGAGGATTGTGGAACTTCTGGACGCA
GGGTGGGAAGCCCTCAAATATTGGTGGATCTCCTACAGTATTGGAGTCAGGAACATAAGAATAGTGTGTT
ACTTGCTCAATGCCACAGCCATAGCAGTAGCTGAGTAA

FIGURE 43

DNA Sequence of E^mΔV₁₂ΔCΔT⁹⁹.T.R (Strain pNL4-3) [SEQ ID NO: 20]:

FIGURE 44

DNA Sequence of Env^mΔC.T.R.N (Strain BH10) [SEQ ID NO: 21]:

ΔCleavage site (**agagaaaaaaga**) →**SpeI**
 tggagcagcaggaagcactatggcgacgcgtcaatgacgctgacggctacaggccagacaattattgtct
 ggtatagtgcagcagcagaacaattgtgagggtattgaggcgcaacagcatctgtcaactcacagt
 ctggggcatcaagcagctccaggcaagaatcctgggtggaaagatacctaaaggatcaacagctcctgg
 ggatttgggggttgctctggaaaactcattgcaccactgctgtgccttggaaatgttagttggagtaataaa
 tctctggaaacagatttggaaataacatgacccctggatggagtggacagagaaaattaacaattacacaagctt
 aatacactccttaattgaagaatcgcaaaaccagcaagaaaagaatgaacaagaattatttggaaattagata
 aatggcaagtttggaaattgtttaacataacaattggctgtgttatataaaattattcataatgata
 gtaggaggcttggtaggttaagaatagttttgtactttctgttagtgaatagagtttaggcagggata
 ttccaccattatcggttcagaccacccacccatcccgaggggacccgacaggcccgaaggaatagaagaag
 aaggtggagagagagacagagacatccattcgattgtgaacggatcccttagcacttatctggacgat
 ctgcggagcctgtgccttcagctaccaccgcttggagacttactcttggattgttaacgaggattgtgg
 acttctgggacgcaggggggtggaaaggccctcaaatattgtggatctccctacagtattggagtcaggagc
 taaagaatagtgcgttagctgtcaatgccacagctatagcagtagctgagggggacagatagggttata
 gaagtagtacaaggagcttataagacttgcacacatctagaagaataagacaggcttggaaaggat
 ttgtctataagatgggtggcaagtggcaaaaaggtagtgggtggatggctgttaaggaaagaatg
 agacgagctgagccagcagcagatgggggtggagcagcatctcgagacctagaaaaacatggagcaatcac
 aagttagcaacacacagcagactacaatgttgcgttggctagaaggcacaagagggaggaggtgggtt
 ttccagtcacacccatcggttacccatggatggacttacaaggcagctgttagatcttagccactttta
 aaagaaaaaggggggacttggaaaggctattactccaaacgaagacaagatattgttgcgttggatcta
 ccacacacaaggctacttccctgtattag

FIGURE 45

DNA Sequence of E^mΔC.N (Strain BH10) [SEQ ID NO: 22]:

ΔCleavage site(agagaaaaaaga)→SpeI

agcaggaagcactatggcgccagcgtcaatgacgctgacggtaacaggccagacaattattgtctggatag
tgcagcagcagaacaatttgctgagggctattgaggcacaacgcatctttgcaactcacagtctgggatc
atcaagcagctccaggcaagaatctggctggaaagatacctaaaggatcaacagctctgggatttgg
gggttgcctggaaaactcattgcaccactgctgtgccttggatgcttagttggagaataatctctgg
aacagatttggaaataacatgacctggatggagttggacagagaaaattacaattacacaagcttata
tccttaattgaagaatcgcaaaaccagcaagaaaagaatgaacaagaattatttggaaattagataatggc
aagtttggaaattggtaacataacaaattggctgtggtatataaaaatttattcataatgatagtaggag
gcttggtaggttaagaatagttttgtactttctgttagtgaatagagtttaggcaggatattcaca
ttatcggttcagaccacccctccaaatcccgaggggacccgcacaggcccgaaggaatagaagaaggtgg
agagagagacagagacagatccattcgattgtgaacggatcttagcacttatctggacgatctgcgg
gcctgtgcctttagtaccaccgcttggagacttactctttagttgttaacgaggattgtggacttctg
ggacgcaggggggtggaaagccctcaaatttggtggatctccatcagttttggagttcaggagctaaagaa
tagtgcttttagctgtcaatgccacagctatagcagtagctgagggacagatagggtatagaagtag
tacaaggagcttataagacttacccatcacactagaagaataagacagggttggaaaggatttgtca
taagatgggtggcaagtggtaaaaagttagtggatggatggctgttaaggaaagaatgagacgag
ctgagccagcagcagatgggtggagcagcatctcgagacctagaaaaacatggagcaatcacaagtagc
aacacagcagctaacaatgctgatgtgcctggctagaaggcacaagaggaggaggaggtggtttccagt
cacacccctcaggtacccatggtaagaccaatgacttacaaggcagctgttagatcttagccactttaaaagaaa
agggggacttggaaaggcttaattcactccaaacgaagacaagatccttgcattgtggatctaccacaca
caaggctacttccctgattag

FIGURE 46

DNA Sequence of E^mΔCAT³⁰⁰.T (BH10) [SEQ ID NO: 23]:

GaattctgcaacaactgctttatccatTTcagaattgggtgtcgacat
EcoRI
Agcagaataggcgttactcgacagaggagagaagaa**atggagcc**agtaga
Tat 1
tcctagactagaggcccttggaaagcatccaggaagtgcgcctaaaactgcTTgtaccaattgcTTattgtaaaa
agtgttgcTTcattgccaagttgtttcataacaaaagccttaggcattcctatggcaggaagaagcgg
agacagcgcacgaagacctcctcaaggcagtcaaggcactcatcaagttcttatcaaagcgttaagttagtaca
tgtaatgcacccatacaaatagcaatagttagcattagtagtagcaataataatagcaatagtgtgtgg
ccatagtaatcatagaatataaggaaaatattaagacaaaagaaaatagacaggtaattgataactaata
gaaagagcagaagacagtggca**atgg**agtagtgaaggagaaatcagcacttgcggagatgggggtggagat
ggggcaccatgcTTggatgtatctgttagtgcTTacagaaaaattgtgggtcacagtctattat
ggggtaacctgtgtggaaaggcaaccaccactctatttgcattgcataagcataatgatacaga
ggtacataatgttggggccacacatgcTTgttacccacagaccccaacccacaagaagttagtattgtta
atgtgacagaaaatttaacatgtggaaaatgacatggtagaacagatgcattgaggatataatcgttta
tgggatcaaagcctaaagccatgtgtaaaatttacccactgcTTgttagttaaagtgcactgattgaa
aatgtataataccatgttagtagcgggagaatgataatggagaaaggagagataaaaaactgcTT
tcaatatacgcacaaagcataagaggtaaggtgcggaaaagaatatgcatttttataaaacttgcattataata
ccaatagataatgataactaccagctatacgcTTgacaagtgcTTacacccctcagtgcattacacaggcctgc
aaaggatcTTggccattccatcacattattgcTTggcgcattctaaaatgtataata
ataagacgttcaatggaaacaggaccatgtacaaatgtcagcacagtacaatgtacacatggaaattggcc
gtatgcattcaactcaactgcTTaaatggcagtgcTTggcagaagaagaggtagtaatttagatgcTTcaatt
cacagacaatgcTTaaaccataatagtagcgtgaaccaatgcTTtagaaattaattgtacaagacccaaaca
acaatacaagaaaaagtatcgcTTatccagagaggaccaggagcattgcTTacaataggaaaaatgg
aatatgagacaagcacattgtacattgttagagacaaaatggaaataacactttaaaacagatagatgca
attaagagaacaatttggaaaataataaaacaataatgcTTaaggcagtgcTTcaggagggaccaggaaaattt
taacgcacagtgcTTaattgtggagggaaattttctactgtacatgcTTacaacacaactgcTTaatagtacttgg
tttaatagtacttggagtagactaaaggcgtacataactgtacaggcggacattggcggacattgtacatgc
aataaaacaaaattataaaacatgtggcaggaaatggcggacattgtacatgcTTccatgc
tttagatgttcatcaatattacaggcgtcattaaacaagagatggcggatataatgcTTacaatgtacttgg
atcttcagacactggaggaggatgtacaggcggacattggcggacattgtacatgcTTaatagtacttgg
aattgtacaccattaggagtagcggacattggcggacattgtacaggcggacattgtacatgc
gacattgttgcTTccatgc
ACTAGTgcacgtggaaatag
gacattgttgcTTccatgc

ΔCleavage site (**agagaaaaaga**) → SpeI
 ttgggagcagcaggaaggcactatgggcgcagcgtcaatgacgctgacggtagccagacaattattgtc
 tggtagatgtgcagcagcagaacaatttgcgtgaggctattggcgcaacagcatctgttgcactcacag
 tctggggcatcaagcagctccaggcaagaatctggctgtggaaagataacctaaaggatcaacagctctg
 gggattttgggttgcgttgcggaaaactcattgcaccactgctgtgccttggaatgcttagtggagtaataa
 atctctggAACAGATTGGAATAACATGACCTGGATGGAGTGGGACAGAGAAATTACATTACACAGCT
 TAATACACTCCTTAATTGAAGAATCGCAAACCAGCAAGAAAAGAATGAACAAGAATTATTGGAAATTAGAT
 AAATGGGCAAGTTGTGGAATTGGTTAACATAACAAATTGGCTGTGGTATATAAAATTATTCTATAATTGAT
 AGTAGGAGGCTTGTGAGGTTAACAGAATAGTTTGTACTTCTGTAGTGAATAGAGTTAGGCAGGGAT
 ATTACCACTATCGTTAGACACCCACCTCCAAATCCGAGGGGACCCGACAGGCCGAAGGAATAGAAGAA
 QAAQGTGQAQAGAGACAGAGACAGATCCATTGATTAGTGAACGGATCCTAGCATTATCTGTGAA

Figure 47

DNA Sequence of E^m/E^m (BH10) [SEQ ID NO: 24]:

Gaattcgccaccatgggagatgaaggagaatatacagacttgtggagatgg
EcoRI Kozak NcoI
gggtggagatggggcaccatgcctggatgttgcgtatgtgtacagaaaaattgtgggtcac
agtctattatgggtacatgtgtggaaaggacaaccaccactctatttgtcatcagatgttaaggcat
atgatacagaggtacataatgtttggccacacatgcctgttgcacccacagaccccaacccacaagaagta
gtattgttaatgtgacagaaaattttacatgtggaaaatgcacatgttagaaacagatgtcatgaggatata
aatcagtttatggatcaaagcctaaagccatgtgtaaaattaacccactctgttttagttaaagtgcata
ctgattgaagaatgataactaataccatgttagtgcgggagaatgataatggagaaaggagagataaaa
aactgcctttcaatatacagacaaggcataagaggtaaggtgcagaaagaatatgcatttttataaact
tgatataataccatagataatgataactaccagctatacgttgcacagttgttaacacccctcgtcattacac
aggcctgtccaaaggatccttgagccaattccatatacattattgtgccccgctgggtttgcattctaa
aatgttaataataagacgttcaatggaaacaggaccatgtacaaaatgtcagcacagtcataatgtacacatgg
aattagccagtagtatcaactcaactgtgtttaatggcagtctggcagaagaagaggttagtaatttagat
ctgccaatttcacagacaatgtctaaaaccataatgtacagctgaccaatctgttagaaattaattgtaca
agacccaaacaacaatacagaaaaaagtatccgtatccagagaggaccaggagagcattgttacaatagg
aaaaatagggaaatatgagacaaggcacattgttaacatttagtagagcaaaatggaaataacactttaaaacaga
tagatagcaaaatttaagagaacaatttggaaataataaaacaataatctttagcgtcctcaggaggggac
ccagaattgttaacgcacagtttattgtggaggggatattttctactgttaattcaacacaactgtttaa
tagtacttggttaatagtagtacttggagtagtactaaagggtcaaaaactgtacaggaagtgcacacaatcccc
tcccatgcagaataaaacaattataaacatgtggcaggaagttaggaaaagcaatgtatgcctccatc
agtggacaaatttagatgttcatcaaatattacaggcgtcttataacaagagatgggtgttagcaacaa
ttagtccgagatcttcagactggaggaggatgtaggcacaattggagaagtgttaattataatata
aagttagaaaaattgaaccattaggatgtacccaccaaggcaaaagagaagagtggcagagagaaaaaa
agagcagtggaaataggagcttggccttgggttcttgggacgcagcaggaacactatggcgcagcgtc
aatgacgctgacggtacagggcagacaattattgtctggtagtgcagcagcagaacaatttgcgttaggg
ctattgaggcgcaacagcatctgttgcactcacagtctgggcatcaagcagctccaggcagaatcctg
gctgtggaaagatacctaaaggatcaacagctcctgggatttgggttgcgtctggaaaactcattgcac
caactgcgtgccttggaaatgttagtgcgttagtgcacccatcttgcataatgcacatgttgc
tggagtggacagagaaaattacaattacacaactccttgcataatgcacccatccatc
caagaaaaagaatgaacaagaattattgtgaatttagataatggcagttgtggatttgcataatgc
aaattggctgtgttatataaaatttattcataatgtatgttaggaggcttgcgttagttaaagatagtttt
ctgtactttctgttagtgcataatgttaggttaggcaggatattcaccattatgcattcagacccacccatc
ccgaggggacccgacaggcccgaaggaatagaagaagaagggtggagagagacagacagatccattcg
attagtgcacggatccttagacttatctggacgatctgcggagcctgtgccttgcgtaccacccgt
tgagagactactcttgcattgttaacgcaggattgtggacttgcgtgcacgcagggggtggaaagccctcaaa
tattgggtggaaatctcctacagtattggagtgcaggactaaagaatgtgttagtgcattcataatgc
agctatagcagtagtgcgtggggacagatagggttatagaagtagtgcattacaaggagcttgcatt
acatacctagaagaataagacagggcttggaaagatatttgcataa

FIGURE 48

Sequences of V3 loop Multi-clade HIV-1 Clones:

| Clade | ACC# | HIV-1 Strain | From(nt) | To(nt) |
|-------|--------|----------------------|----------|--------|
| B | M15654 | BH10 | 885 | 992 |
| A | U09127 | 192UG037WHO.01083hED | 888 | 992 |
| C | U09126 | 192BR025WHO.01093hED | 876 | 980 |
| D | U43386 | 192UG024.2 | 888 | 989 |
| E | U08458 | 193TH976.17 | 894 | 998 |
| F | U27401 | 193BR020.17 | 888 | 992 |
| G | U30312 | 192RU131.9 | 885 | 989 |

Tgtacaagacccaacaacaatacaaaaaagtatccgtatccagagagga
ccagggagagcatttgttacaataggaaaaataggaaatatgagacaagca
cattgt **Clade B [SEQ ID NO: 25]**

Tgtaccagacctaacaacaatacaaaaaagtgtacgtataggaccagga
caaacattctatgcaacaggtgatataataggggatataagacaagcacat
tgt **Clade A [SEQ ID NO: 26]**

Tgtacgagacccaacaataatacaaaaaagtataaggataggaccagga
caagcattctatgcaacaggagaaaataataggagatataagacaagcacat
tgt **Clade C [SEQ ID NO: 27]**

Tgcacaaggccctacaacaatataagacaaaggaccccataggactaggg
caagcactctataacaagaagaatagaagatataagaagagcacattgt
Clade D [SEQ ID NO: 28]

Tgtaccagaccctccaccaatacaagaacaagtatacgtataggaccagga
caagtattctatagaacacaggagacataacaggagatataagaaaagcatat
tgt **Clade E [SEQ ID NO: 29]**

Tgtacaagacccaacaatacaaaaaagaatatctttaggaccagga
cgagtattttatacagcaggagaaaataataggagacatcagaaaggcacat
tgt **Clade F [SEQ ID NO: 30]**

Tgtaccagacctaataacaatacaaaaaagtataactttgcaccagga
caagcgctctatgcaacagggtgaaataataggagatataagacaagcacat
tgt **Clade G [SEQ ID NO: 31]**

FIGURE 49A

DNA sequence of modified Env including multi-clade V3 loops [SEQ ID NO: 32]:

Atgagagtgaaggagaaaatatcagcacttgtggagatgggggtggagatggggcaccatgctcctggat
gttcatgtatctgttagtgctacagaaaaattgtgggtcacagtcttattatgggtacctgtgtgaaaggaag
caaccaccactctatttgtgcatcagatgctaaagcatatgatacagaggtacataatgtttggccaca
catgcctgtgtacccacagaccccaacccacaagaagtagtattggtaatgtgacagaaaatttaacat
gtggaaaaatgacatggtagaacagatgcatgaggatataatcagttatggatcaaagcctaaagccat
gtgtaaaatttaacccactctgtgtt**ggagctggtagttgttaacacac**cgt

V1, V2 deletion, GAG insertion

CattacacaggcctgtccaaaggatcccttgagccaaattccatacattattgtgccccggctggtttgcgattctaaaatgtataataaagacgticatggAACAGGACCATGTACAAATGTCAAGCACAGTACAATGTACACATGGAAATTAGGCCAGTAGTATCAACTCAACTGCTGTTAAATGGCAGTCGGCAGAAGAAGAGGTAGTAATTAGATCTGCCAATTCACAGACAAATGCTAAACCATAATAGTACAGCTGAACCAATCTGTAGAAATTAA**tttgt**ACAAGACCAACAA

Start of Clade B

Tacaagaaaaagtatccgtatccagagaggaccagggagagcatttgtacaataggaaaaatagggaaata
tgagacaagcacattgtctcggtgttaccag

Insert a *AvaI* site

Acctaacaacaatacagaaaaaagtgtacgtataggaccaggacaaacattctatgcaacaggtatataatagggatataagacaagcacattgt**tgtac**

Clade C

Gagacccaacaataatacacaagaaaaagtataaggataggaccaggacaagcattctatgcaacaggagaaa
taataqgagatataagacacaagcacattgtt**tg**

Clade D

**Cacaaggccctacaacaatataaagacaaaggaccccccataggactagggcacactctataacaacaagaaa
gaatagaagatataagaagagcacatttttg**

Clade E

Taccagaccctccaccaataacaagaacaagtatacgtatagaccaggacaagtattctatagaacaggag
acataacaggagatataagaaaagcatattgtggatctgttacaagacccaacaacaatacaagaaaaaga
atatctttagg

BamHI clade F

Accaggacgagtat~~ttt~~tatacagcaggagaaaataaggagacatcagaaggcacattgt**tg**taccagac
ctaataacaatacacaagaaaaagtataacttt

Clade G

Tgcaccaggacaagcgcttatgcaacaggtgaaataataggagatataagacaaggcacattgtctcgaa
acattactagaqcaaaaatqqaataaacacttt

Insert a Aval

Aaaacagatagatagcaaattaagagaacaatttggaaataataaaacaataatcttaagcagtccctcag
gaggggacccagaaattgttaacgcacagtttaattgtggaggggaattttctactgttaattcaacacaa
ctgttaatagtacttggttaatagtacttggagtaactaaagggtcaataacactgaaggaaagtgcac
aatcaccctccatgcagaataaaacaattataaacatgtggcaggaagttaggaaaagcaatgtatgccc
ctcccatcagtggacaaatttagatgttcatcaaattacagggctgttattacaagagatgggttaat
agcaacaatgagtccgagatcttcagacctggaggaggagatgagggacaattggagaagtgaattata
taaatataaagttagtaaaaattgaaccattaggagtagcaccaccaaggaaagagaagagtggcaga
ctagtgcagtggg

Cleavage site mutation (SpeI)

FIGURE 49B

Amino acid sequence of modified Env including multi-clade V3 loops [SEQ ID NO: 33]:

M T T A E I V S K V G A P F T F R Y P T T G N A N G A G V L T M R N R P L T N G Q V M S E W A R M V S C N S G F C Q S K N V R Y P A Y T N D N G N E K N T F E W C N S T F L L I Q P T L L Y T D V F L A E N C L T N T P A N T N R T I N E T I W N H N G Q S E E K L T L K L W W I D I D F M V S C N S G F C Q S K N V R Y P A Y T N D N G N E K N T F E W C N S T F L L I Q P T L L Y T D V F L A E N C L T N T P A N T N R T I N E T I W N H N G Q S E E K L T L K L W W I D I D F K M V A D W Q C P T G E V R K N D T I R E S D K G S D T I N W T G I I K R L A I Q I S W S A W S E G G K T M D S I K H E I T G N G N E I I T G R I K G N T F T D V N E Y K F Q A L G A E E W S M Y L P Y P K S N I F I E Q K I T I R I Q D I I R D I I L I C F I K T F Y R G R E A W W D Q S L L Q M V D N N L T H N R V L S G R I K G R I R R I T R K F G N T A G R K V A Q A R G S R N L L * H I W T P D K S Y G P V N I N K G S D T R I K S R F Q Q K G S L M L P V V A L Q I C N E Q W L L C K E Q M P V C T V I Q R M S D I I P R G A L K A A I Q E T P Y L G V Q G L Q L S K I Q N L W S E V E V C I A G V R S I R V I R R I A P Y G A P H D S F W C A L G K T S S H A G S N E W L R A A H V E V T P P S S V Q Q R R I Q G H G C P H G C Q L K G Y T I P R D E A M I L E L E Y N S G E T V L M L A G T Q N I G H G A P H G C Q T F C V T L N R D N G Q S G R L G A Q L Y C I S Q T S W K T W V H T C F N L F N P C P H G C Q C A R Y T F R Y I E P S S I G G D G I A Q T L T W L E N L R L A N E P P A V L T C G L G C Q C A R Y T F R Y I E P S S I G G D G I A Q T L T W L E N L G V C H T I C V L T N N R A C T T F R Y S T P T N T R F I Q N N I S W A A M N W D A N H L L Q W W F T V D L K I S L D T R G Q C A T L P R R Y P A S Q E T N I Q N N V G S Q V K T N I L W L

FIGURE 50A

1. DNA sequence of p17/24 in natural form [SEQ ID NO: 34]:

atgggtgcgagagcgtcagtattaagcggggagaattagatcgatggaaaaattcggttaaggccagg
ggaaagaaaaatataaattaaacatatacgatggcaagcaggagctagaacgattcgcatgttaatc
ctggcctgttagaaacatcagaaggctgttagacaaatactgggacagctacaaccatccctcagacagga
tcagaagaacttagatcattataatacagtagcaaccctctattgtgtcatcaaaaggatagagataaa
agacaccaaggaagcttagacaagatagaggaagagcaaaacaaaagtaagaaaaaagcacagcaagcag
cagctgacacaggacacagcagtcaggtcagccaaattaccctatacgatgcagaacatccaggggcaaattg
gtacatcaggccatatacacttagaaactttaatgcattgtgtttcagccatcagaaggagccaccccaca
agaagtaataccatgttttcagcattatcagaaggagccaccccacaagatttaaacaccatgctaaaca
cagtgggggacatcaagcagccatgcataatgttaaaagagaccatcaatgaggaagctgcagaatgggat
agagtacatccagtcgtcatgcagggcctattgcaccaggccagatgagagaaccaaggaaagtgcacatgc
aggaactacttagtacccttcaggaacaaataggatggatgacaaaataatccacatccctaggagaaaa
tttataaaagatggataatcttggattaaataataatgatagaatgtatagccctaccagcatctggac
ataagacaaggacaaaagaaccttttagagactatgttagaccggttctataaaactctaagagccgagca
agcttcacaggaggtaaaaattggatgacagaaaccttgggtccaaatgcgaacccagattgtaa
ctatttaaaagcattggaccaggcgctacactagaagaaatgatgacagcatgtcaggagtaggagga
ccggccataaggcaagagtttgtaa

2. DNA sequence of p17/24 in secreted form [SEQ ID NO: 35]:

atgagagtgaaggagaaaatcagcacttgtggagatgggggtggagatgg
gp120 signal peptide
ggcaccatgctccttggatgttgcattgtgtgtgtcgagagcg
p17/p24
tcagtattaagcggggagaattagatcgatggaaaaattcggttaaggccaggggaaagaaaaata
taaattaaacatatacgatggcaagcaggagctagaacgattcgcatgttaatctggcctgttagaaa
catcagaaggctgttagacaaatactgggacagctacaaccatccctcagacaggatcagaagaactttaga
tcattatataatacagtagcaaccctctattgtgtcatcaaaaggatagagataaaagacaccaaggaaagc
tttagacaagatagaggaagagcaaaacaaaagtaagaaaaaagcacagcaagcagcagctgacacaggac
acagcagttagtgcggccatattaccctatacgatgcagaacatccaggggcaaattgtacatcaggccata
tcacctagaactttaatgcattgtgttttagatgttagaagagaaggcttcagccagaatgtacatccat
gttttcagcattatcagaaggagccaccccacaagatttaaacaccatgctaaacacagtgggggacatc
aagcagccatgcaatgttaaaagagaccatcaatgaggaagctgcagaatgggatagagtacatccatgt
catgcaggccattgcaccaggccagatgagagaaccaagggaaagtgcacatgcaggactactgtac
ccttcaggaacaaataggatggatgacaaaataatccacatccctaggagaaatttataaaagatgga
taatccttggattaaataataatgatagaatgtatagccctaccagcatctggacataagacaaggacca
aaagaaccttttagagactatgttagaccgggtctataaaactctaagagccgagcaagcttcacaggaggt
aaaaaattggatgacagaaacccatgttgggtccaaatgcgaacccagattgtaaagactatttaaaagcat
tgggaccaggcgctacactagaagaaatgatgacagcatgtcaggagtaggaggacccggccataaggca
agagtttgtaa

FIGURE 50A -continued

1. DNA sequence of p17/24 in membrane form [SEQ ID NO: 36]:

atgagagtgaaggagaaaatatcagcaacttgtggagatgggggtggagatgg
gp120 signal peptide
Ggcaccatgctcctggatgtttagatctgttagtgctggtgcgagagcg
P17/p24
tcagtattaagcggggagaatttagatcgatggaaaaattcggttaaggccaggggaaagaaaaata
taaattaaaacatatacgatggcaagcaggagctagaacgattcgcgatataatcctggcctgttagaaa
catcagaaggctgttagacaaatactggacagctacaaccatcccttcagacaggatcagaagaactttaga
tcattatataatacagtagcaaccctctattgtgtcatcaaaggatagagataaaagacaccaaggaagc
tttagacaagatagaggaagagcaaaacaaaagtaagaaaaaagcacagcaagcagcagctgacacaggac
acagcagtcaggtcagccaaaattaccctatacgatgcagaacatccagggcaatggtacatcaggccata
tcacctagaactttaaatgcattggtaaaagttagttagaagagaaggcttcagccccagaagtaataccat
gttttcagcattatcagaaggagccacccacaagattaaacaccatgctaaacacacagtgggggacatc
aagcagccatgcaaatgttaaaagagaccatcaatgaggaagcgtcagaatggatagagtacatccagtg
catgcagggcctattgcaccaggccagatgagagaaccaagggaaagtgcacatgcaggaactactgtac
ccttcaggaacaaaataggatggatgacaaaataatccacctatcccagtaggagaaaattataaaagatgg
taatcctggattaaaataaaatagtaagaatgtatagccctaccagcattctggacataagacaaggacca
aaagaaccttttagagactatgttagaccgggtctataaaactctaagagccgagcaagcttcacaggaggt
aaaaaattggatgacagaaaccttgttggtccaaaatgcgaacccagattgtaaagactatttaaaagatgg
tgggaccagcggctacactagaagaaatgtgacagcatgtcagggagtagggaggaccggccataaggca
agattttg
ttattcataatgtatgttaggaggcttgttagtttaagaatagttttgctgtactttctgttagtgaatag
agtttaggcaggatattcaccattatcggttcagaccacccacccatcccgaggggataa
gp41 transmembrane domain

FIGURE 50B

1. Amino acid sequence of p17/24 in natural form [SEQ ID NO: 37]:

| | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| M | I | A | E | E | R | N | Q | Q | A | P | Q | P | D | N | N | P | E | N | L | R |
| G | R | S | G | E | I | K | V | A | F | Q | M | V | I | P | K | K | Q | A | E | V |
| A | L | R | C | L | E | S | S | I | S | D | L | H | A | P | I | E | A | N | E | |
| R | R | E | R | R | I | K | Q | S | P | L | K | A | G | I | V | P | S | P | M | * |
| A | P | L | Q | S | K | K | N | P | E | N | E | T | P | T | V | M | R | E | C | T |
| S | G | E | I | L | D | K | Y | R | V | T | T | P | T | V | M | R | E | C | T | |
| V | G | R | L | Y | T | A | P | T | I | M | I | I | S | G | Y | D | V | K | A | |
| L | K | F | G | N | K | Q | I | L | P | L | N | A | T | E | S | Y | K | T | C | |
| S | K | A | Q | T | E | Q | V | N | M | N | E | P | L | I | P | V | N | I | Q | |
| G | K | V | L | V | A | A | Q | A | F | T | E | G | Q | Y | T | D | W | L | G | |
| G | Y | N | Q | A | L | A | N | W | S | V | A | Q | E | K | S | R | M | K | V | |
| E | K | P | P | T | D | A | I | V | A | G | A | M | Q | R | I | F | T | A | G | |
| L | L | G | S | L | K | D | Q | K | L | G | E | R | I | W | L | Y | E | L | G | |
| D | K | L | L | Y | I | T | G | V | S | H | W | E | G | I | D | K | T | G | P | |
| R | H | L | Q | C | E | G | Q | V | E | Q | D | P | W | I | I | T | L | P | G | |
| W | I | E | T | V | E | H | M | E | G | A | R | R | M | L | R | L | L | A | H | |
| K | W | S | S | Q | Q | S | H | K | T | M | H | S | N | L | G | A | Q | T | A | |

2. Amino acid sequence of p17/24 in secreted form [SEQ ID NO: 38]:

M W S G E I L D K Y Y Y R V T T P T V M R E T
T R A P L Q S K K N N N P E N E G T P R F Q M
L W G R S G E I K V V V A F Q M V I P K K Q E V
K G A L R C L E S S S S I S D L H A P I E A E L
I R A I A E E R N Q Q Q Q A P Q P D N N P E L R
H W S K W S S Q Q S S S S H K T M H S N L G A T A
G L C E V T G H E S S S S V E A A V G T G Q R A K
F Y I W I E T V E H H H M E G A R R M L R L A H
E Q M R H L Q C E G G G Q V E Q D P W I I T P G
D K M L L G S L K D D D Q K L G E R I W L Y L G
C E G E K P P T D A A A A I V A G A M Q R I F A G
V K L G Y N Q A L A A A A N W S V A Q E K S R K V
I R M S K A Q T E Q Q Q V N M N E P L I P V I Q
H L K F G N K Q Q Q I L P L N A T E S Y T C

FIGURE 50B-continued

1. Amino acid sequence of p17/24 in membrane bound form [SEQ ID NO: 39]:

W S G G E I L D K Y R V T T P T V M R E C T I V P
R A P P L Q S K K N P E N E G T P R F Q D M F S L
G A L L R C L E S S I S D L H A P I E A N E L V T
W G R R S G E I K V A F Q M V I P K K Q A E V A Q
R A I I A E E R N Q Q A P Q P D N N P E N L R F F
W S K K W S S Q Q S H K T M H S N L G A Q T A V S
L C E E V T G H E S V E A A V G T G Q R V A K I L
H I W W I E T V E H M E G A R R M L R L L A H R P
Q M R R H L Q C E G Q V E Q D P W I I T L P G L S
Y L D D K L L Y I T G V S H W E G I D K T G P G Y
K M L L G S L K D Q K L G E R I W L Y E L G V G
E G E E K P P T D A I V A G A M Q R I F T A G L Q
K L G G Y N Q A L A N N W S V A Q E K S R M K V G R *
V L G G K V L V A A Q A F T E G Q Y T D W L G G V G
M T L L K F G N K Q I L P L N A T E S Y K T C I N P
R M S S K A Q T E Q V N M N E P L I P V N I Q V R R

FIGURE 51A

1. DNA sequence of p17 in natural form [SEQ ID NO: 40]:

atgggtgcgagagcgtcagtattaagcggggagaattagatcgatggaaaaattcg
gttaaggccagggggaaagaaaaatataaattaaaacatatagtatggcaagcaggg
agctagaacgattcgcagttaatcctggcctgttagaaacatcagaaggctgtagacaa
atactggacagctacaaccatccctcagacaggatcagaagaacttagatcattata
taatacagttagacaaccctctattgtgtgcataaaggatagagataaaagacaccaagg
aagcttagacaagatagaggaagagcaaaacaaaagtaagaaaaaagcacagcaagca
qcaqctgacacacaggacacagcagtcaggtcagccaaaattactaa

2. DNA sequence of p17 in secreted form [SEQ ID NO: 41]:

atgagagtgaaggagaaatcagcacttgtggagatgggggtggagatgg
gp120 signal peptide
ggcaccatgctcttggatgttcatgtatgttagtgcgtgcagagcgt
p17

tcagtattaagcggggagaattagatcgatggaaaaattcggttaaggccaggggg
aaagaaaaatataaattaaaacatatagtatggcaagcagggagctagaacgattcg
cagttaatcctggcctgttagaaacatcagaaggctgtagacaaatactgggacagcta
caaccatcccttcagacaggatcagaagaacttagatcattataatacagtagcaac
cctctattgtgtcatcaaaggatagagataaaagacaccaaggaagcttagacaaga
tagaggaagagcaaaacaaaagtaagaaaaaagcacagcaagcagcagctgacacagga
cacaqcaqtcaqgtcagccaaaattactaa

3. DNA sequence of p17 in membrane bound form [SEQ ID NO: 42]:

tcagtattaagcggggagaattagatcgatggaaaaattcggttaaggccagggg
aaagaaaaatataaattaaaacatatagtatggcaagcagggagctagaacgattcg
cagttaatcctggcctgttagaaacatcagaaggctgtagacaataactggacagct
caaccatcccttcagacaggatcagaagaacttagatcattatataatacagttagcaac
cctctattgtgtgcatcaaaggatagagataaaagacaccaaggaagcttagacaaga
tagaggaagagcaaaacaaaagtaagaaaaaagcacagcaagcagcagctgacacagga
cacagcagtcaaggtcagccaaaattac
ttattcataatgatagtaggaggcttggtaggttaagaatagttttgtactttc
tgttagtgaatagagtttaggcaggatattcaccattatcggttcagacccaccccaa
tcccgagggataa
gp41 transmembrane domain

FIGURE 51B

1. Amino acid sequence of p17 in natural form [SEQ ID NO: 43]:

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| M | G | A | R | A | S | V | L | S | G | E | L | D | R | W | E | K |
| I | R | L | R | P | G | G | K | K | Y | K | L | K | H | I | V | W |
| A | S | R | E | L | E | R | F | A | V | P | G | L | L | E | T | S |
| E | G | C | R | Q | I | L | G | Q | L | P | S | L | Q | T | G | S |
| E | E | L | R | S | L | Y | N | T | V | T | L | Y | C | V | H | Q |
| R | I | E | I | K | D | T | K | E | A | A | D | K | I | E | E | Q |
| N | K | S | K | K | K | A | Q | A | A | A | D | T | G | H | S | S |
| Q | V | S | Q | N | Y | * | | | | | | | | | | |

2. Amino acid sequence of p17 in secreted form [SEQ ID NO: 44]:

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| M | R | V | K | E | K | Y | Q | H | L | W | R | W | W | R | W | G |
| T | M | L | L | G | M | L | M | I | C | S | A | G | A | R | S | V |
| L | S | G | G | E | L | D | R | W | E | K | I | R | R | E | P | G |
| K | K | K | Y | K | L | K | H | I | V | W | A | S | L | R | E | R |
| F | A | V | N | P | G | L | L | E | T | S | E | G | C | R | Q | L |
| G | Q | L | Q | P | S | L | Q | T | G | S | E | E | L | L | S | Y |
| G | Q | L | Q | P | S | L | Q | T | G | S | E | E | L | R | R | T |
| N | T | V | A | T | L | Y | C | V | H | Q | R | I | E | I | K | D |
| K | E | A | L | D | K | I | E | E | S | Q | N | K | S | K | K | A |
| Q | Q | A | A | A | D | T | G | H | S | S | Q | V | S | Q | N | * |

3. Amino acid sequence of p17 in membrane bound form [SEQ ID NO: 45]:

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| M | R | V | K | E | K | Y | Q | H | L | W | R | W | W | R | W | G |
| T | M | L | L | G | M | L | M | I | C | S | A | G | A | R | S | V |
| L | S | G | G | E | L | D | R | W | E | K | I | R | R | E | P | G |
| K | K | K | Y | K | L | K | H | I | V | W | A | S | L | R | E | R |
| G | Q | L | Q | P | S | L | Q | T | G | S | E | E | L | R | S | Y |
| N | T | V | A | T | L | Y | C | V | H | Q | R | I | E | I | K | D |
| K | E | A | L | D | K | I | E | E | S | Q | N | K | S | S | K | A |
| Q | Q | A | A | A | D | T | G | H | S | S | Q | V | S | Q | F | T |
| F | I | M | I | V | G | G | L | G | V | Y | R | I | L | F | V | H |
| S | V | V | N | R | V | R | Q | G | G | S | P | R | S | F | T | H |
| L | P | I | P | R | G | * | | | | | | | | | | |

FIGURE 52B

1. Amino acid sequence of p24 in natural form [SEQ ID NO: 49]:

| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| M | P | I | V | Q | N | I | Q | G | V | M | V | H | Q | A | A | P | E | N | G | T | P | R | F | Q | D | M | | | | |
| R | T | I | L | N | M | W | F | S | V | A | G | M | W | H | T | P | S | L | K | A | G | I | V | P | S | P | M | * | | |
| V | T | M | P | I | N | T | E | G | V | A | G | A | H | V | A | V | G | Q | A | P | Q | P | D | N | N | P | E | N | L | R |
| T | T | I | I | S | T | A | P | G | Q | Y | E | Q | R | W | G | T | G | Q | R | V | V | P | D | N | N | P | E | N | L | R |
| T | P | T | V | G | E | I | L | T | T | D | R | Q | I | W | I | I | T | Q | R | V | A | A | E | N | E | A | E | V | L | |
| P | R | M | D | Y | S | S | P | V | D | R | M | Q | F | L | Y | E | L | G | T | L | R | L | L | A | Q | T | A | K | H | |
| T | E | C | V | K | E | N | I | W | M | K | T | A | G | G | I | D | K | P | G | A | R | R | M | L | R | L | A | H | P | |
| C | K | T | K | T | T | I | Q | G | V | G | L | V | G | P | H | E | L | G | P | A | R | R | M | L | R | L | A | H | P | |
| T | A | C | C | C | Q | Q | Q | Q | Q | Q | Q | Q | Q | Q | Q | Q | Q | Q | Q | Q | Q | Q | Q | Q | Q | Q | Q | Q | Q | Q |

2. Amino acid sequence of p24 in secreted form [SEQ ID NO: 50]:

| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| M | R | V | K | E | K | M | Y | Q | H | L | W | R | W | R | W | R | W | G | W | W | R | Q | A | F | T | E | Q | Y | T | D | W | L | G | G | * | | | | | | | | | | |
| T | M | L | Q | V | L | M | G | V | M | S | P | A | S | P | E | P | S | P | L | N | M | N | E | P | L | I | P | V | N | I | Q | V | R | A | G | A | Q | R | I | F | T | A | G | | |
| Q | O | G | S | H | Q | D | E | A | A | H | R | Q | Y | I | W | G | I | D | K | P | R | T | T | P | T | V | M | R | E | C | T | Y | D | V | K | A | M | V | I | N | P | | | | |
| K | L | K | S | H | W | E | G | E | A | A | V | G | T | G | Q | P | D | N | N | P | E | N | T | P | R | F | Q | D | M | F | S | L | W | N | W | S | V | A | E | K | S | R | M | K | V |
| L | G | R | E | R | I | W | L | I | D | K | T | R | M | L | R | Q | R | V | V | A | K | A | Q | Y | T | D | W | L | G | G | * | W | N | W | S | V | A | E | K | S | R | M | K | V | |
| G | E | R | I | W | L | Y | E | I | D | K | T | R | M | L | R | Q | R | V | V | A | K | A | Q | Y | T | D | W | L | G | G | * | W | N | W | S | V | A | E | K | S | R | M | K | V | |
| R | E | I | W | L | Y | E | I | D | K | T | R | M | L | R | Q | R | V | V | A | K | A | Q | Y | T | D | W | L | G | G | * | W | N | W | S | V | A | E | K | S | R | M | K | V | | |
| E | I | W | L | Y | E | I | D | K | T | R | M | L | R | Q | R | V | V | A | K | A | Q | Y | T | D | W | L | G | G | * | W | N | W | S | V | A | E | K | S | R | M | K | V | | | |
| G | E | R | I | W | L | Y | E | I | D | K | T | R | M | L | R | Q | R | V | V | A | K | A | Q | Y | T | D | W | L | G | G | * | W | N | W | S | V | A | E | K | S | R | M | K | V | |
| V | G | E | R | I | W | L | Y | E | I | D | K | T | R | M | L | R | Q | R | V | V | A | K | A | Q | Y | T | D | W | L | G | G | * | W | N | W | S | V | A | E | K | S | R | M | K | V |
| S | G | E | R | I | W | L | Y | E | I | D | K | T | R | M | L | R | Q | R | V | V | A | K | A | Q | Y | T | D | W | L | G | G | * | W | N | W | S | V | A | E | K | S | R | M | K | V |
| H | E | R | I | W | L | Y | E | I | D | K | T | R | M | L | R | Q | R | V | V | A | K | A | Q | Y | T | D | W | L | G | G | * | W | N | W | S | V | A | E | K | S | R | M | K | V | |
| R | E | I | W | L | Y | E | I | D | K | T | R | M | L | R | Q | R | V | V | A | K | A | Q | Y | T | D | W | L | G | G | * | W | N | W | S | V | A | E | K | S | R | M | K | V | | |
| G | E | R | I | W | L | Y | E | I | D | K | T | R | M | L | R | Q | R | V | V | A | K | A | Q | Y | T | D | W | L | G | G | * | W | N | W | S | V | A | E | K | S | R | M | K | V | |
| V | G | E | R | I | W | L | Y | E | I | D | K | T | R | M | L | R | Q | R | V | V | A | K | A | Q | Y | T | D | W | L | G | G | * | W | N | W | S | V | A | E | K | S | R | M | K | V |
| S | G | E | R | I | W | L | Y | E | I | D | K | T | R | M | L | R | Q | R | V | V | A | K | A | Q | Y | T | D | W | L | G | G | * | W | N | W | S | V | A | E | K | S | R | M | K | V |
| H | E | R | I | W | L | Y | E | I | D | K | T | R | M | L | R | Q | R | V | V | A | K | A | Q | Y | T | D | W | L | G | G | * | W | N | W | S | V | A | E | K | S | R | M | K | V | |
| R | E | I | W | L | Y | E | I | D | K | T | R | M | L | R | Q | R | V | V | A | K | A | Q | Y | T | D | W | L | G | G | * | W | N | W | S | V | A | E | K | S | R | M | K | V | | |
| G | E | R | I | W | L | Y | E | I | D | K | T | R | M | L | R | Q | R | V | V | A | K | A | Q | Y | T | D | W | L | G | G | * | W | N | W | S | V | A | E | K | S | R | M | K | V | |
| V | G | E | R | I | W | L | Y | E | I | D | K | T | R | M | L | R | Q | R | V | V | A | K | A | Q | Y | T | D | W | L | G | G | * | W | N | W | S | V | A | E | K | S | R | M | K | V |
| S | G | E | R | I | W | L | Y | E | I | D | K | T | R | M | L | R | Q | R | V | V | A | K | A | Q | Y | T | D | W | L | G | G | * | W | N | W | S | V | A | E | K | S | R | M | K | V |
| H | E | R | I | W | L | Y | E | I | D | K | T | R | M | L | R | Q | R | V | V | A | K | A | Q | Y | T | D | W | L | G | G | * | W | N | W | S | V | A | E | K | S | R | M | K | V | |
| R | E | I | W | L | Y | E | I | D | K | T | R | M | L | R | Q | R | V | V | A | K | A | Q | Y | T | D | W | L | G | G | * | W | N | W | S | V | A | E | K | S | R | M | K | V | | |
| G | E | R | I | W | L | Y | E | I | D | K | T | R | M | L | R | Q | R | V | V | A | K | A | Q | Y | T | D | W | L | G | G | * | W | N | W | S | V | A | E | K | S | R | M | K | V | |
| V | G | E | R | I | W | L | Y | E | I | D | K | T | R | M | L | R | Q | R | V | V | A | K | A | Q | Y | T | D | W | L | G | G | * | W | N | W | S | V | A | E | K | S | R | M | K | V |
| S | G | E | R | I | W | L | Y | E | I | D | K | T | R | M | L | R | Q | R | V | V | A | K | A | Q | Y | T | D | W | L | G | G | * | W | N | W | S | V | A | E | K | S | R | M | K | V |
| H | E | R | I | W | L | Y | E | I | D | K | T | R | M | L | R | Q | R | V | V | A | K | A | Q | Y | T | D | W | L | G | G | * | W | N | W | S | V | A | E | K | S | R | M | K | V | |
| R | E | I | W | L | Y | E | I | D | K | T | R | M | L | R | Q | R | V | V | A | K | A | Q | Y | T | D | W | L | G | G | * | W | N | W | S | V | A | E | K | S | R | M | K | V | | |
| G | E | R | I | W | L | Y | E | I | D | K | T | R | M | L | R | Q | R | V | V | A | K | A | Q | Y | T | D | W | L | G | G | * | W | N | W | S | V | A | E | K | S | R | M | K | V | |
| V | G | E | R | I | W | L | Y | E | I | D | K | T | R | M | L | R | Q | R | V | V | A | K | A | Q | Y | T | D | W | L | G | G | * | W | N | W | S | V | A | E | K | S | R | M | K | V |
| S | G | E | R | I | W | L | Y | E | I | D | K | T | R | M | L | R | Q | R | V | V | A | K | A | Q | Y | T | D | W | L | G | G | * | W | N | W | S | V | A | E | K | S | R | M | K | V |
| H | E | R | I | W | L | Y | E | I | D | K | T | R | M | L | R | Q | R | V | V | A | K | A | Q | Y | T | D | W | L | G | G | * | W | N | W | S | V | A | E | K | S | R | M | K | V | |
| R | E | I | W | L | Y | E | I | D | K | T | R | M | L | R | Q | R | V | V | A | K | A | Q | Y | T | D | W | L | G | G | * | W | N | W | S | V | A | E | K | S | R | M | K | V | | |
| G | E | R | I | W | L | Y | E | I | D | K | T | R | M | L | R | Q | R | V | V | A | K | A | Q | Y | T | D | W | L | G | G | * | W | N | W | S | V | A | E | K | S | R | M | K | V | |
| V | G | E | R | I | W | L | Y | E | I | D | K | T | R | M | L | R | Q | R | V | V | A | K | A | Q | Y | T | D | W | L | G | G | * | W | N | W | S | V | A | E | K | S | R | M | K | V |
| S | G | E | R | I | W | L | Y | E | I | D | K | T | R | M | L | R | Q | R | V | V | A | K | A | Q | Y | T | D | W | L | G | G | * | W | N | W | S | V | A | E | K | S | R | M | K | V |
| H | E | R | I | W | L | Y | E | I | D | K | T | R | M | L | R | Q | R | V | V | A | K | A | Q | Y | T | D | W | L | G | G | * | W | N | W | S | V | A | E | K | S | R | M | K | V | |
| R | E | I | W | L | Y | E | I | D | K | T | R | M | L | R | Q | R | V | V | A | K | A | Q | Y | T | D | W | L | G | G | * | W | N | W | S | V | A | E | K | S | R | M | K | V | | |
| G | E | R | I | W | L | Y | E | I | D | K | T | R | M | L | R | Q | R | V | V | A | K | A | Q | Y | T | D | W | L | G | G | * | W | N | W | S | V | A | E | K | S | R | M | K | V | |
| V | G | E | R | I | W | L | Y | E | I | D | K | T | R | M | L | R | Q | R | V | V | A | K | A | Q | Y | T | D | W | L | G | G | * | W | N | W | S | V | A | E | K | S | R | M | K | V |
| S | G | E | R | I | W | L | Y | E | I | D | K | T | R | M | L | R | Q | R | V | V | A | K | A | Q | Y | T | D | W | L | G | G | * | W | N | W | S | V | A | E | K | S | R | M | K | V |
| H | E | R | I | W | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

FIGURE 53A

DNA sequence of modified Env including multi-clade V3 loops and Tat [SEQ ID NO: 52]:

Gaattctgcaacaactgctgttatccatttcagaattgggtgtcgacatagcagaataggcgt
tactcgacagaggagagaagaa**atg**gagccagttagatcctagactagagccc

Tat1

Tggaagcatccaggaagtcaagcctaaaactgctgtaccaattgttattgtaaaaagtgttgctt
tcattgccaagttgtttcataacaaaaggccttaggcatttcctatggcaggaagaagcggagac
agcgaacaagacccctcaaggcagtcagactcatcaagttcttatcaaaagcagtaagtagta
catgtaatgcaacctatacaaatacgcaatagttagcattagtagtagcaataatacgaaatagt
tgtgtgtccatagtaatcatagaatatacgaaatattaagacaaagaaaaatagacaggttaa
ttgatagactaatagaaagagcagaagacagtggca**atg**agagtgaaggagaaatcagcactt
gtggagatgggggtggagatggg

Envelope

Gcaccatgctccttggatgtttagtgcattgttagtgcatacagaaaaattgtgggtcacagtctat
tatgggttacctgtgtggaaaggaagcaaccaccactcttgcattgtgcatacgatgctaaagcata
tgatacagaggtacataatgtttggccacacatgcctgttgcattttgcatacgatggccaaaccacaag
aagttagtattggtaatgtgacagaaaattttacatgtggaaaaatgacatgttgcatacgatgt
catgaggatataatcagttatggatcaaaggcattgcatacgatgttgcatacgatgttgcatacgatgt
tgtt**ggagctggtagttgt**taacacctca

Delete V1V2, insert Gly, Ala, Gly

gtcattacacagcctgtccaaaggatccttgcattttgcatacgatgttgcatacgatgttgcatacgatgt
tggtttgcattctaaaatgttaataaaatgacatgttgcatacgatgttgcatacgatgttgcatacgatgt
gcacagtacaatgttacacatggataggccagtagtcaactcaactgtgttgcatacgatgttgcatacgatgt
ctggcagaagaagaggttagtaatttagatctgccaatttcacagacaatgttgcatacgatgttgcatacgatgt
acagctgaaccaatctgttagaaattt**gt**tacaag

First multi-clade repeat

Acccaacaacaatacaagaaaaagtatccgtatccagagaggaccaggagagcatttttacaa
taggaaaaatagaaatatgagacaaggcacattgtctcggtgttgcattttgcatacgatgttgcatacgatgt
agaaaaagtgtacgtataggaccaggacaaacattctatgcacaggttatataatagggatata
aagacaaggcacattgttgcattttgcatacgatgttgcatacgatgttgcatacgatgt
gacaaggcattctatgcacaggagaataataggagatataagacaaggcacattgttgcatacgatgt
ccctacaacaataagacaaaggccccataggacttagggcaagcactctatacaacaagaag
aatagaagatataagaagacatgttgcattttgcatacgatgttgcatacgatgttgcatacgatgt
gtataggaccaggacaaatgttgcatacgatgttgcatacgatgttgcatacgatgttgcatacgatgt
tgtggatcctgtacaagacccaaacaatacaagaaaaagaataatctttaggaccaggacgat
attttatacagcaggagaataataggagacatcagaaggcacattgttgcatacgatgttgcatacgatgt
acaatacaagaaaaagtataactttgcaccaggacaaggcacattgttgcatacgatgttgcatacgatgt
ggagatataagacacattgt**tcgggtgt**taccagacactaacaataaata

Second multi-clade repeat

Caagaaaaagtgtacgtataggaccaggacaaacattctatgcacaggttatataatagggat
ataagacaaggcacattgttgcattttgcatacgatgttgcatacgatgttgcatacgatgt
aggacaaggcacattctatgcacaggagaataataggagatataagacaaggcacattgttgcatacgatgt
ggccctacaacaataagacaaaggccccataggacttagggcaagcactctatacaacaaga
agaatagaagatataagaagacatgttgcattttgcatacgatgttgcatacgatgttgcatacgatgt
acgtataggaccaggacaaatgttgcattttgcatacgatgttgcatacgatgttgcatacgatgt
attgtggatcctgtacaagacccaaacaatacaagaaaaagaataatctttaggaccaggacgat
gtattttatacagcaggagaataataggagacatcagaaggcacattgttgcatacgatgttgcatacgatgt
taacaatacaagaaaaagtataactttgcaccaggacaaggcacattgttgcatacgatgttgcatacgatgt
ggagatataagacacattgt**tcgggtgt**taccagacactaacaataaata

FIGURE 53A-continued

taggagatataagacaagcacattgtctcg~~gg~~aaacatttagtagagcaaaatggaataacactt
AvaI site, end of two multi-clade repeat
Aaaacagatagat~~g~~caaattaagagaacaatt~~g~~aaataataaaaacaataatctttaagcagt
cctcaggaggggacccagaaattgt~~a~~acgcacagtttaattgtgaggggatttttactgt
aattcaacacaactgtttaat~~g~~tacttgg~~t~~taat~~g~~tacttggag~~t~~actaaagggt~~c~~aaataa
cactgaaggaagt~~g~~acacaat~~c~~accctccc~~t~~atgcagaataaaaacaattataa~~a~~catgtggcagg
aagttaggaaaagcaatgtat~~g~~ccc~~c~~ccatc~~g~~tg~~g~~acaattagatgttcatcaa~~a~~ttaca
ggc~~t~~ctt~~g~~tattaacaagagatgg~~t~~g~~t~~aat~~g~~caacaat~~g~~at~~t~~cc~~g~~ag~~t~~ctc~~g~~ag~~c~~act~~g~~gagg
aggagat~~t~~gagg~~g~~acaatt~~g~~g~~g~~aga~~t~~g~~a~~attataa~~a~~at~~g~~at~~t~~g~~a~~attaa~~g~~at~~t~~g~~a~~accat
taggat~~g~~tagc~~ac~~cc~~c~~accaagg~~c~~aaagagaag~~g~~at~~g~~gt~~c~~ag~~c~~act~~g~~tg~~c~~ag~~t~~g~~g~~gaat~~g~~agg~~g~~ct
ttgtt~~c~~ct~~t~~g~~g~~

Delete the cleavage site, insert SpeI site
gttcttggagcagcaggaagcactatggcgcagcgt~~t~~caat~~g~~ac~~g~~c~~t~~ac~~g~~g~~t~~ac~~g~~g~~c~~ca~~g~~ac
aattattgtctgg~~t~~at~~g~~tc~~g~~c~~g~~c~~a~~caatt~~g~~ctg~~g~~agg~~g~~ctatt~~g~~agg~~g~~gc~~a~~ca~~g~~cat
ctgttgc~~a~~actcac~~g~~t~~c~~ctggg~~c~~at~~ca~~agc~~ag~~ct~~c~~cagg~~g~~ca~~a~~at~~c~~c~~t~~gg~~c~~t~~g~~g~~g~~aa~~a~~gata
cctaaaggat~~c~~ac~~g~~ct~~c~~c~~t~~ggg~~g~~att~~g~~gg~~t~~g~~c~~t~~g~~g~~g~~aa~~a~~act~~c~~att~~g~~c~~a~~cc~~a~~ct~~g~~ct~~g~~
tgc~~c~~tt~~g~~g~~a~~at~~g~~c~~t~~at~~g~~tg~~g~~g~~a~~taataat~~c~~t~~c~~gg~~a~~ac~~g~~at~~t~~g~~g~~g~~a~~ata~~a~~cat~~g~~ac~~c~~t~~g~~g~~g~~at~~g~~
gag~~t~~gg~~g~~ac~~g~~ag~~g~~aa~~a~~att~~a~~acaatt~~a~~c~~a~~g~~c~~tt~~a~~at~~a~~c~~t~~c~~c~~tt~~a~~att~~g~~g~~a~~at~~c~~g~~c~~aaa
cc~~g~~ca~~a~~g~~g~~aa~~a~~g~~a~~at~~g~~a~~a~~ca~~a~~g~~a~~att~~t~~g~~g~~g~~a~~att~~g~~gg~~c~~aa~~g~~tt~~t~~g~~g~~g~~a~~att~~g~~g~~t~~
ttaacataaca~~a~~att~~g~~g~~c~~t~~g~~g~~g~~t~~t~~ataaaattattcataat~~g~~at~~g~~at~~g~~tag~~g~~agg~~g~~ct~~t~~gg~~t~~ag~~g~~t
ttaagaat~~g~~at~~t~~tt~~g~~ct~~g~~tact~~t~~ct~~g~~t~~g~~at~~g~~g~~a~~at~~g~~at~~t~~g~~g~~g~~c~~agg~~g~~at~~t~~c~~ac~~c~~t~~att~~t~~c
gtt~~c~~ag~~g~~acc~~c~~ac~~c~~ct~~c~~cc~~a~~at~~cc~~g~~ag~~gg~~g~~ac~~cc~~g~~ac~~agg~~ccc~~g~~a~~agg~~g~~at~~a~~aga~~a~~agg~~g~~t~~g~~
gag~~g~~ag~~g~~ag~~g~~ac~~g~~ag~~g~~at~~cc~~c~~at~~tc~~g~~att~~g~~ta~~a~~c~~g~~g~~t~~c~~ct~~tg~~c~~act~~t~~ct~~g~~g~~t~~aa

gp41, delete the 300 bp at C-terminal

FIGURE 53B

Amino acid sequence of modified Env including multi-clade V3 loops and Tat

[SEQ ID NO: 53]:

W W F T V D L K I S L D T R G Q C A T L P R R Y P A R Y P A Y T N D N G N E K N T F E W C N S T F L L I Q P T L L Y F E L
R L L A N E P P A V L T C G L G C Q C A R Y T F R Y P T T G N A N G A G V L T M R N R P L T N G Q V M S E W V E S
W K T W V H T C F N L F N P C P H G C Q T F C V T L C T T F R Y S T P T N T R F I Q N N I S W A A M N W D A N H L L I G
G E T V L M L A G T Q N I G H G A P H G C V S R C A G Q C A T L P R R Y P A S Q E T N I Q N N V G S Q V K T N I L W R G N
W T T N V Q K Q A C T A E R A I Q G A L C Q G G C Q L G C Q C A R Y T F R Y I E P S S I G G D G I A Q T L T W L E N L E V
R A A H V E V T P P S S V Q Q R R I Q G H G C P H G C P H G C Q T F C V T L N R D N G Q S G R L G A Q L Y C I S Q T G P L
W S E V E V C I A G V R S I R V I R R I A P Y G A P H G A P H G C V S R C A G L G C K K I D M P V G V Q R I Q T E I V R R
L C K E Q M P V C T V I Q R M S D I I P R G A L K A A I Q G A L C Q G G C Q L K G Y T I P R D E A M I L E L E Y N N L D I
H I W T P D K S Y G P V N I N K G S D T R I K S R F Q R R I Q G H G C P H G C S S F S R P T G I S T G L V K L N K F G P S
Q M V D N N L T H N R V L S G R I K G R I R R I I T R V I R R I A P Y G A P H D S F W C A L G K T S S H A G S N E W G G R
Y L P Y P K S N I F I E Q K I T I R I Q D I I R D I I S D I I P R G A L K A A I Q E T P Y L G V Q G L Q L S K I Q N V R D
K M V A D W Q C P T G E V R K N D T I R E S D K G S D K G S D T R I K S R F Q Q K G S L M L P V V A L Q I C N E Q W I P R
E G G K T M D S I K H E I T G N G N E I I I T G R I K G R I K G R I R R I I T R K F G N T A G R K V A Q A R G S R N L M I D
K L Y A P N W G P N T A I N I N T N G N R R T T I R I Q D I I R D I I L I C F I K T F Y R G R E A W W D Q S I P R *
V L Y D V F L A E N C L T N T P A N T N R T I N E T I N D T I R E S D K G S D T I N W T G I I K R L A I Q I S W S A F L E W
M T T A A E I V S K V G A P F T F R Y P T T G N A N G N T N G N R R T T I R I N K S S S E S S L A G V R Q L N M E K K T G I
R M V S C N S G F C Q S K N V R Y P A Y T N D N G N E N G N E I I I T G R I K G N T F T D V N E Y K F Q A L G A E E W L H G I

FIGURE 54A

**DNA sequence of modified Env including multi-clade V3 loops, Tat and Rev
[SEQ ID NO: 54]:**

gaattctgcaacaactgctgttatccatttcagaattgggtgtcgacatagcagaat
aggcgttactcgacagaggagcaagaat**tg**gagccagtagatcctagactagagccc
Tat1

tggaagcatccaggaagttagcctaaaactgctgtaccaattgtattgtaaaaagtg
ttgcttcattgccaagttgtttcataacaaaagccttaggcattctc**atgg**cagga
Rev1

agaagcggagacagcgacgaagacccctcaaggcagtcagactcatcaagttctcta
tcaaagcagtaagttagtacatgtaatgcaacctataaaatagcaatagtagcattagt
atgcaataataatagcaatagtgtgtggccatagtaatcatagaatataaggaaaa
tattaagacaagaaaaatagacaggtaattgtatagactaatagaaagagcagaagac
agtggca**atg**agagtgaaggagaaatcagcacttgtggagatgggggtggagatggg
Envelope

Gcaccatgctcctggatgttatgtatctgttagtgcatacagaaaaattgtggtcaca
gtctattatgggtacctgtgtggaaaggcaaccaccactctatttgcattcaga
tgctaaagcatatgatacagaggtaataatgtttggccacacatgcctgttaccca
cagaccccaacccacaagaagttagtattgttaatgtgacagaaaaatttaacatgtgg
aaaaatgacatggtagaaacagatgcatgaggatataatcagttatggatcaaagcct
aaagccatgttaaaattaacccactctgttt**ggagctgg**tagttgttaacacctca

Delete V1V2, insert Gly,ala,gly

gtcattacacaggcctgtccaaaggatcccttggccaaattccatcattattgtgc
cccggtgggtttgcattctaaaatgtataataagacgttcaatggacaggaccat
gtacaaatgtcagcacagtacaatgtacacatggatttaggcaggtagtatcaactcaa
ctgctgttaatggcagtctggcagaagaagaggttagttagatctgccaatttcac
agacaatgctaaaaccataatagtacagctgaaccaatctgttagaaattaatt**tg**tacaa
g

First multi-clades repeat

Acccaacaacaatacaagaaaaagtatccgttatccagagaggaccaggagacatttg
ttacaataggaaaaataggaaatatgagacaaggcacattgtctcggtgtaccagacct
aacaacaatacaagaaaaagtgtacgtataggaccaggacaaacattctatgcaacagg
tgatataataggggatataagacaaggcacattgttgcacatggggatataaggaccc
gatataagacaaggcacattgtgcacaaggccctacaacaatataagacaaaggaccc
cataggacttagggcaagcactctataacaagaagaatagaagatataagaagagcac
attgttgcacatggggatataaggacccatcataacaagaacaagtatacgtataggaccaggacaa
gtattctatagaacaggagacataacaggagatataagaaaagcatattgtgatcctg
tacaagacccaacaacaatacaagaaaaagaatatctttaggaccaggacgagtatttt
atacagcaggagaataataggagacatcagaaaggcacattgttgcacatggggatataagg
aacaatacaagaaaaagtataactttgcaccaggacaaacgcgtctatgcaacagggtga
aataataggagatataagacaaggcacattgt**ctcggt****tgt**accagacctaacaacaata

Second multi-clade repeat

caagaaaaagtgtacgtataggaccaggacaaacattctatgcaacagggtgatataata
ggggatataagacaaggcacattgttgcacatggggatataacaagaaaaagtat

FIGURE 54A-continued

aaggataggaccaggacaaggcattctatgcaacaggagaataataggagatataagac
aagcacattgtgcacaaggccataacaataagacaaggaccccataggacta
gggcaagcactctataacaagaagaatagaagatataagaagagcacattgtgtac
cagaccctccaccaataacaagaacaagtatacgtataggaccaggacaagtattctata
gaacaggagacataacaggagatataagaaaagcatattgtggatcctgtacaagaccc
aacaacaatacaagaaaaagaataatctttaggaccaggacgagtattttatacagcagg
agaaataataggagacatcagaaaggcacattgtgtaccagacctaataacaatacaa
aaaaagtataactttgcaccaggacaagcgcttatgcaacaggtgaaataatagga
gatataagacaaggcacattgtctcgaacatttagtagcaaaaatgaaataacacttt

AvaI site, end of two multi-clade repeat

Aaaacagatagatagcaaattaagagaacaatttggaaataataaaacaataatcttta
agcagtccctcaggaggggacccagaaattgttaacgcacagtttatattgtggagggaa
ttttctactgttaattcaacacaactgtttaatagtacttggtaatagtacttggag
tactaaagggtcaaataacactgaaggaagtgacacaatcaccctccatgcagaataa
aacaattataaacatgtggcaggaagttaggaaaagcaatgtatgcccctccatcagt
ggacaaatttagatgttcatcaaattacaggctgttattacaagagatgggtgtaa
tagcaacaatgagtccgagatcttcagacctggaggaggatatgagggacaatttgg
gaagtgaatttatataatataaagttagtaaaaattgaaccattaggagtagcacccacc
aaggcaaagagaagagtggcagactgtgcagtggaaataggagcttggcttgg

Delete the cleavage site, insert SpeI

gttcttggagcagcaggaaggcactatggctgcacgtcaatgacgctgacggcacagg
ccagacaattattgtctgtatatagtgcagcagcagaacaattgtctgaggctatttag
gchgcaacagcatctgttcaactcacagtctgggcatcaaacagctccaggcaagaat
cctggctgtggaaagatacactaaaggatcaacagctcctgggattttgggtgtctg
gaaaactcattgcaccactgtgtgcatttggaaatgttagttggagtaataatctctg
gaacagatttggataaacatgacactggatggagttggacagagaaattaacaattacac
aagcttaataacactcctaattgaagaatcgcaaaaccagcaagaaaagaatgaacaag
aattattggaaatttagataatggcaagttgtggaaattggtaacataacaattgg
ctgtgttatataaaattattcataatgatagtaggaggcttggtaggttaagaatagt
ttttgtgtactttctatagtgaatagtagttggcaggatattcaccattatcgttc
agaccacccatcccaatcccgaggggacccgacaggcccgaaggaatagaagaaggt
ggagagagagacagagacagatccattcgattagtgaacggatccttagcacttatctg
ggacgatctgcggagcctgtgcctttagtaccaccgcttggagagacttactcttga
ttgttaacgaggattgtggaaacttctggacgcaggggtggaaagccctcaaatttgg
tggaatctcctacagtattggagtcaggaactaaagaatagtgtttaacttgctcaa
tgccacagccatagcagtagctgagtaa

gp41, but 99 bp truncation at C-terminal

FIGURE 54B

Amino acid sequence of modified Env including multi-clade V3 loops, Tat and Rev [SEQ ID NO: 55]:

W W F T V D L K I S L D T R G Q C A T L P R R Y P A R Y P A Y T N D N G N E K N T F E W C N S T F L L I O P T L L Y F F E L L G L *
R L L A N E P P A V L T C G L G C Q C A R Y T F R Y T F R Y P T T P A N T N R T I N E T I W N H N G Q S E E K L T L K L W W I D I A Q E A R W K
W K T W V H T C F N L F N P C P H G C Q T F C V T L C T T F R Y S T P T N T R F I Q N N I S W A A M N W D A N H L L I L I G H R Q A
G E T V L M L A G T Q N I G H G A P H G C V S R C A G Q C A T L P R R Y P A S Q E T N I Q N N V G S Q V K T N I L W R P G N Y G S V
W T T N V Q K Q A C T A E R A I Q G A L C Q G G C Q L G C Q C A R Y T F R Y I E P S S I G G D G I T Q T L T W L E N L S E V S L W A
R A A H V E V T P P S S V Q Q R R I Q G H G C P H G C P H G C Q T F C V T L N R D N G Q S G R L G C Q L Y C I S Q T G Y P L F L Y I
W S E V E V C I A G V R S I R V I R R I A P Y G A P H G A P H G C V S R C A G L G C K K I D M P V G V Q R I Q T E I V G R R L E Q A
L C K E Q M P V C T V I Q R M S D I I P R G A L K A A I Q G A L C Q G G C Q L K G Y T I P R D E A M I L E L E Y N N L Q D I C V L T
H I W T P D K S Y G P V N I N K G S D T R I K S R F Q R R I Q G H G C P H G C S S F S R P T G I S T D L V K L N K F G R P S L I L A
Q M V D N N L T H N R V L S G R I K G R I R R I I T R V I R R I A P Y G A P H D S F W C A L G K T S S H A G S N E W G V G R S R N N
Y L P Y P K S N I F I E Q K I T I R I Q D I I R D I I S D I I P R G A L K A A I Q E T P Y L G V Q G L Q L S K I Q N V R R D R T W L
K M V A D W Q C P T G E V R K N D T I R E S D K G S D K G S D T R I K S R F Q Q K G S L M L P V V A L Q I C N E Q W I N P R L V W L
E G G K T M D S I K H E I T G N G N E I I T G R I K G R I K G R I R R I I T R K F G N T A G R K V A Q A R G S R N L M V I D D I Y N
K L Y A P N W G P N T A I N I N T N G N R R T T I R I I Q D I I R D I I L I C F I K T F Y R G R E A W W D Q S I I P R D L K V
V L Y D V F L A E N C L T N T P A N T N R T I N E T I N D T I R E S D K G S D T I N W T G I I K R L A I Q I S W S A F S L E W L L A
V M T A A E I V S K V G A P F T F R Y P T T G N A N G N T N G N R R T T I R I N K S S S E S S L A G V R Q L N M E K K V T G L D E N N

FIGURE 55A

DNA sequence of HIV-1 (strain BH10) Protease (PI, nt 1407-1907) [SEQ ID NO: 56]:

atgttcttaggaaagatctggcctcataaggaaaggccaggaaatttcttcagagcagaccagaccaccccccaccagaagagagcttcaggtctggggatagagacaacaactccccctcagaaggcaggagccgatagacaaggaaactgtatccttaactccctcagatcactcttgcacgcaccctctgtcacaataaaagatagggggcaactaaaggaaagctctattagatacaggagcagatgatacagtattagaagaaatgagttgccaggaagatggaaacccaaaatgataggggaattggaggtttatcaagtaagacagtatgtatcagatactcatagaaatctgtggacataaagctataggtacagtattatggacctacacctgtcaacataatttgaagaaatctgtgactcagattggacttgcactttaattttaa

FIGURE 55B

Amino acid sequence of HIV-1 (strain BH10) Protease (PI) [SEQ ID NO: 57]:

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| M | F | R | E | D | L | A | F | L | Q | G | K | A | R | E | F |
| S | E | T | R | A | N | S | P | T | I | S | S | E | Q | N | S |
| N | S | T | R | R | E | L | Q | V | W | G | R | D | P | S | |
| S | E | A | G | A | D | R | G | T | V | V | F | N | N | Q | |
| T | L | W | Q | R | P | L | V | T | T | K | G | G | L | K | |
| T | L | L | D | T | G | A | D | D | I | V | E | E | S | Q | |
| A | G | R | W | K | P | K | M | G | G | G | G | F | K | K | |
| Q | Q | Y | D | Q | I | L | I | C | I | H | H | F | M | P | |
| L | L | V | G | P | T | P | E | G | G | R | R | I | L | V | |
| G | G | C | T | L | N | F | * | I | I | I | I | L | T | I | |

FIGURE 56A

DNA sequence of HIV-1 (strain BH10) Gag-PI [SEQ ID NO: 58]:

Atgggtgcagagcgtcagtattaagcggggagaattgatgggaaaaattcg
gttaaggccaggggaaagaaaaatataattaaacatatatgatgggcaggg
agctaaacgattcgcgatttatcctggctgttgaaacatcagaaggctgtagacaa
atactgggacagctaaccatcccttucagacaggatcagaaggaacttagatcatta
taatacagtugcaaccccttattgtgcatcaaaaggatgagataaaagacacccaagg
aagcttugacaagatgaggaagagcaaaacaaaagtaugaaaaagacacgcaag
gcagctugacacaggacacagcgatcaggtcagccaaattaccctatugtcagacat
ccaggggcaatggtacatcaggccatatcaccctugtaactttaatgcatgggtaaaag
tagtaugagaagggctttugcccaugtaatuaccugatgttttugcatugattatcgaa
ggagccaccccacaagatttauacaccatugcttauacacagtggggggacatcauag
catugcaaatugttaaaagugacatucaatgaggaagctgcagaaatugggatugatgacat
cagtgcatgcagggcctttugcatgaccaggccagatgaggaaacccacggggaaggtgacat
gcaggaaactactagtacccttuuggcaacaaatgaggatuggatgacaaatuccacct
ccccugatgaggaaattttaaaagatggatauacccttgggataaataaatugtaagaa
tgtatugccctuaccugacatugacataugacaggacaaugaaacccttuttugagac
tatgtagacccgttctutataaauactctugaggccugcaugctttugacagggatttaa
ttggatugacagaaacccttugttggtccaaatugcaacccccugatgtaagactatttta
aagcatttgggacccacgcggtctuacactgaggaaatugatgacacgatugtcagggatugagac
ggacccggcccaugggcaugaggttttuggtctugaggcaatugaggccaaugtaacacag
tacccataatugtgcagagggcaugatttuggatuggatgttugttgtaatugttcc
attgttggcaaaagaaagggccacacgccugaggaaatugtcagggccctttugatgggatugctgt
tggaaatgtggaauggaggacccaaugatgaaagattgtactggaggacaggctuat
cttttugggaagatgtgccctuttugctacagggggaaugatgttttugtcagaggca
ccaggccaaugacccccccacccttugttttugugatggatuggatgttugtcagaggca
agaggatugtcaggtctuggggtugaggacaacugactccccctugcaaggccagggccgt
acaaggaaactgtatugctttugactttugccatugugatgactctugggcaacgacccccctugtc
caataaaagatggggggcaactaauggagctgtctugatgatagaggggcagatgat
gttattgaggaaatugatggatgttugccaggatgggaaacccaaugatgaggggggaaatugg
aggttugttttugatgaaugacgatgttugatgactuugatggatuggatgttugacataaug
ctatuggtacgtttugatgttttugactuugatggatuggatgttugacataaug
actuugatggatgttugacatttaaugttttugaa

FIGURE 57

Primers for multi-clade V3 loops:

Clade A: (1). forward primer A888F5 [SEQ ID NO: 60]:

5'-aaa tca acc gga att gaa ttc cct cgg gtg tac cag acc taa caa caa tac-3'
EcoRI Aval

(2). reverse primer A-CR3 [SEQ ID NO: 61]:

5'-att gtt ggg tct cgt aca aca atg tgc ttg tct tat atc ccc-3'

Clade C: (3). forward primer A-CF5 [SEQ ID NO: 62]:

5'-ggg gat ata aga caa gca cat tgt acg aga ccc aac aat ac-3'

(4). reverse primer C980R3 [SEQ ID NO: 63]:

5'-gtt gta ggg cct tgt gca aca atg tgc ttg tct tat atc -3'

Clade D: (5). forward primer D888F5 [SEQ ID NO: 64]:

5'-gat ata aga caa gca cat tgt tgc aca agg ccc tac aac-3'

(6). reverse primer D-ER3 [SEQ ID NO: 65]:

5'-gtt gga ggg tct ggt aca aca atg tgc tct tct tat -3'

Clade E: (7). forward primer D-EF5 [SEQ ID NO: 66]:

5' -ata aga aga gca cat tgt tgt acc aga ccc tcc acc-3'

(8). reverse primer E998R3 [SEQ ID NO: 67]:

5'-gta ttg ttg ttg ggt ctt gta caa caa tat gct ttt ctt ata tct cc-3'

Clade F: (9). forward primer F888F5 [SEQ ID NO: 68]:

5'-gga gat ata aga aaa gca tat tgt tgt aca aga ccc aac aac aat ac-3'

(10). reverse primer F-GR3 [SEQ ID NO: 69]:

5'-gtt att agg tct ggt aca aca atg tgc ctt tct gat gtc-3'

Clade G: (11). forward primer F-GF5 [SEQ ID NO: 70]:

5'-gac atc aga aag gca cat tgt tgt acc aga cct aat aac-3'

(12). reverse primer G989R3 [SEQ ID NO: 71]:

5'-aat aaa cta gtc tag acc ccc gag tct aga aca atg tgc ttg tct tat atc tcc-3'

AvaI XbaI